PLANT BREEDING ABSTRACTS

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* General studies see also individual crops

C. A. B.
10 JAN 1955
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Journals examined in the preparation of

PLANT BREEDING ABSTRACTS

Journals (excluding reports) examined in the preparation of Plant Breeding Abstracts

* Indicates journals not available in the Library of the School of Agriculture, Cambridge.

Abstracts of Dissertations of Nebraska University	Abstr. Diss. Univ. Neb.
Abstracts of Dissertations of Ohio State University	Abstr. Diss. Ohio Univ.
*Abstracts of Dissertations of the University of Maryland	Abstr. Diss. Univ. Md.
Acta Agriculturae Scandinavica	Acta agric. Scand.
Acta Agronomica	Acta agron.
Acta Biologica, Budapest	Acta biol., Bp.
*Acta botanica Neerlandica	Acta bot. neerl.
*Acta forestalia Fennica	Acta for. fenn.
Acta Microbiologica Polonica	Acta Microbiol. Polon.
Acta Societatis Botanicorum Poloniae, Warszawa	Acta Soc. Bot. Polon.
*Acta Societatis Scientiarum Fennicae, Helsinki	Acta Soc. Sci. fenn.
Acta Tropica	Acta trop.
Advancement of Science	Advanc. Sci.
Advances in Agronomy	Advanc. Agron.
Advances in Genetics	Advanc. Genet.
Agrártudományi	Agrártudományi
Agri Hortique Genetica, Landskrona	Agri hort. genet., Landskrona
Agricoltura toscana, Firenze	Agricoltura tosc.
Agricoltura delle Venezie	Agricoltura d. Venezie
*Agricultor Venezolano	Agricultor venezol.
Agricultura, Louvain	Agricultura, Louvain
*Agricultura, Madrid	Agricultura, Madr.
Agricultura Técnica, Santiago	Agricultura téc., Santiago
Agricultura Tropical, Bogotá	Agricultura trop.
Agricultural Development Paper, FAO	Agric. Developm. Pap. FAO
Agricultural Gazette of New South Wales	Agric. Gaz. NSW
Agricultural Handbook of the U.S. Department of Agriculture	Agric. Handb. US Dep. Agric.
Agricultural History, Washington	Agric. Hist.
Agricultural Journal, Fiji	Agric. J. Fiji
Agricultural Merchant	Agric. Merch.
Agricultural News, Hungary	Agric. News, Hung.
Agricultural Progress, London	Agric. Progr.
Agricultural Research, Washington	Agric. Res., Wash.
Agricultural Science, Cairo	Ulum Zira'. (Agric. Sci.), Cairo
Agricultural Studies, FAO	Agric. Stud. FAO
Agriculture and Animal Husbandry, Uttar Pradesh	Agric. Anim. Husb. Uttar Pradesh
Agriculture. Journal of the Ministry of Agriculture, London	Agriculture, Lond.
Agriculture Monograph of the United States Department of Agriculture	Agric. Monogr.
*Agriculture, Montréal	Agriculture, Montréal
Agriculture, Pakistan	Agriculture, Pakistan
Agrobiologija	Agrobiologija (Agrobiology)
*Agrokémia és Talajtan	Agrokémia és Talajtan
Agronomia Angolano	Agron. angol.
Agronomía, Lima	Agronomía, Lima

Agronomia Lusitana	Agron. lusit.
Agronomía Tropical	Agron. trop., Venezuela
Agronomie Tropicale	Agron. trop., Nogent
Agronomy Journal	Agron. J.
Agros	Agros, Rio Grande do Sul
Allahabad Farmer	Allahabad Fmr.
*Allgemeine Forstzeitung	Allg. Forstztg.
*American Fruit Grower	Amer. Fruit Gr.
American Institute of Crop Ecology, Washington	Amer. Inst. Crop Ecol., Wash.
*American Journal of Botany	Amer. J. Bot.
*American Midland Naturalist	Amer. Midl. Nat.
*American Naturalist	Amer. Nat.
*American Nurseryman	Amer. Nurserym.
American Potato Journal	Amer. Potato J.
American Tomato Yearbook	Amer. Tomato Yearb.
Anais da Escola Superior de Agricultura "Luiz de Queiroz", Piracicaba	An. Esc. Agric. Queiroz
Anais do Instituto Superior de Agronomia, Lisboa	An. Inst. sup. Agron., Lisboa
Anales de Edafología y Fisiología Vegetal	An. Edafol. Fisiol. veg.
Anales de la Escuela Nacional de Ciencias Biológicas	An. Esc. nac. Cienc. biol., Méx
Anales de la Estación Experimental de Aula Dei	An. Estac. exp. Aula Dei
Anales del Instituto de Biología, Universidad de México	An. Inst. Biol. Univ. Méx.
Anales del Instituto Fitotécnico de Santa Catalina	An. Inst. fitotéc. S. Catalina
Anales del Instituto Nacional de Investigaciones Agronómicas, Madrid	An. Inst. nac. Invest. agron., Madr.
Analyst, London	Analyst
*Angewandte Botanik, Berlin	Angew. Bot.
Anglo-Swedish Review	Anglo-Swed. Rev.
Annales de l'École Nationale d'Agriculture de Grignon	Ann. Éc. Agric. Grignon
Annales de l'École Nationale d'Agriculture de Montpellier	Ann. Éc. Agric. Montpellier
Annales de l'École Nationale d'Agriculture de Rennes	Ann. Éc. Agric. Rennes
Annales Facultatis Agronomicae Universitatis Agriculturae, Budapest	Ann. Fac. agron. Univ. agric., Bp.
Annales de Gembloux	Ann. Gembl.
Annales de l'Institut Agricole de l'Algérie	Ann. Inst. agric. Algér.
Annales de l'Institut Expérimental du Tabac de Bergerac	Ann. Inst. exp. Tab. Bergerac
Annales de l'Institut National Agronomique, Paris	Ann. Inst. nat. agron., Paris
Annales de l'Institut National de la Recherche Agronomique	Ann. Inst. nat. Rech. agron., Paris
Annales Instituti Biologici, Tihany	Ann. Inst. biol., Tihany
Annales du Service Botanique de la Direction Générale de l'Agriculture, Tunisie	Ann. Serv. bot. Tunis
Annales Universitatis Mariae Curie-Skłodowska, Lublin.	Ann. Univ. M. Curie-Skłodowska
Annali della Accademia d'Agricoltura di Torino	Ann. Accad. Agric. Torino
Annali della Facoltà di Agraria di Bari	Ann. Fac. Agr. Bari
Annali della Facoltà di Agraria di Perugia	Ann. Fac. Agr. Perugia
Annali della Facoltà di Agraria di Portici	Ann. Fac. Agr. Portici
Annali della Facoltà di Agraria della Università, Pisa	Ann. Fac. Agr. Pisa
Annali della Facoltà di Scienze Agrarie della Università, Palermo	Ann. Fac. Sci. agrar. Univ., Palermo
Annali della Sperimentazione Agraria, Roma	Ann. Sper. agr.
Annali della Stazione Chimico-agraria Sperimentale di Roma	Ann. Staz. chim.-agr. Roma
Annals of Applied Biology, Cambridge	Ann. appl. Biol.
*Annals of Botany, London	Ann. Bot., Lond.
*Annals of Eugenics, London	Ann. Eugen., Lond.
*Annals of Mathematical Statistics, Ann Arbor	Ann. math. Statist.

*Annals of Missouri Botanical Garden, St. Louis, Missouri	Ann. Mo. bot. Gdn.
Annual Review of Biochemistry	Annu. Rev. Biochem.
Annual Review of Microbiology	Annu. Rev. Microbiol.
Annual Review of Plant Physiology	Annu. Rev. Pl. Physiol.
*Applied Statistics	Appl. Statist.
Araneta Journal of Agriculture	Araneta J. Agric.
Archief voor Koffiecultuur	Arch. Koffiecult.
Archief voor Rubbercultuur	Arch. Rubbercult.
Archief voor Theecultuur	Arch. Theecult.
Archiv der Deutschen Landwirtschaftsgesellschaft, Hannover	Arch. dtsch. LandwGes.
Archiv für Gartenbau	Arch. Gartenb.
Archiv der Julius Klaus-Stiftung für Vererbungsforschung, Sozial-anthropologie und Rassenhygiene, Zürich	Arch. Klaus-Stift. VererbForsch.
*Archiv für Mikrobiologie	Arch. Mikrobiol.
Archives of Biochemistry, New York	Arch. Biochem.
Archives de Recherches Agronomiques et Pastorales au Viêt-Nam	Arch. Rech. agron. pastor. Viêt-Nam
Archivo Fitotécnico del Uruguay	Arch. fitotéc. Urug.
Arkansas Farm Research	Arkans. Fm. Res.
*Arkiv för Botanik, Uppsala	Ark. Bot.
Arquivos do Instituto Biológico, São Paulo	Arq. Inst. biol., S. Paulo
Arquivos do Instituto de Pesquisas Agronômicas Pernambuco	Arq. Inst. Pesq. agron.
Atti Istituto Botanico dell' Università, Pavia	Atti Ist. bot. Univ. Pavia
Australian Forestry	Aust. For.
Australian Journal of Agricultural Research	Aust. J. agric. Res.
Australian Journal of Biological Science	Aust. J. biol. Sci.
Australian Journal of Botany	Aust. J. Bot.
Australian Sugar Journal	Aust. Sug. J.
*Bacteriological Review	Bact. Rev.
Beet Grower, Dublin	Beet Gr.
*Beiträge zur Biologie der Pflanzen	Beitr. Biol. Pfl.
Beretning om Landboforeningernes Virksomhed for Planteavl paa Sjælland	Beretn. Planteavl Sjælland
Beretning om Planteavlen paa Lolland-Falster	Beretn. Planteavl. Loll.-Falster
Bergcultures	Bergcultures
*Berichte der deutschen botanischen Gesellschaft, Berlin	Ber. dtsch. bot. Ges.
Berichte des Ōhara Instituts für Landwirtschaftliche Forschungen	Ber. Ōhara Inst.
*Berichte der Schweizerischen Botanischen Gesellschaft	Ber. schweiz. bot. Ges.
Beten, Vallar, Mossar	Beten, Vallar
Better crops (with Plant Food)	Bett. Crops
*Bibliographia Genetica, 's Gravenhage	Bibliogr. genet.
Bi-monthly Bulletin of the North Dakota Agricultural Experiment Station	Bi-m. Bull. N. Dak. agric. Exp. Sta.
Biochemical Journal, Cambridge	Biochem. J.
*Biochimica et Biophysica Acta	Biochim. biophys. Acta
Biodynamica	Biodynamica
Biological Bulletin of the Marine Biological Laboratory, Wood's Hole, Mass.	Biol. Bull., Wood's Hole
*Biological Reviews and Biological Proceedings of the Cambridge Philosophical Society, Cambridge	Biol. Rev.
Biológico (O)	Biológico
*Biologisches Zentralblatt, Leipzig	Biol. Zbl.

Biology and Human Affairs	Biology
*Biometrics	Biometrics
*Biometrics Bulletin	Biomet. Bull.
*Biometrika, Cambridge	Biometrika
Bjulletenj Glavnogo Botaničeskogo Sada	Bjull. Glavnogo Bot. Sada (Bull. Princ. Bot. Gdn.), Moskva-Leningrad
Blumea, Leiden	Blumea
Blyttia	Blyttia
Bodenkultur	Bodenkultur
*Boletim Junta Nacional das Frutas, Lisboa	Bol. Jta. nac. Frutas, Lisboa
Boletim do Ministério da Agricultura, Rio de Janeiro	Bol. Minist. Agric., Rio de J.
Boletim da Secretaria de Agricultura, Indústria e Comércio do Estado de Pernambuco	Bol. Sec. Agric. Pernambuco
Boletim do Serviço Nacional de Pesquisas Agronômicas	Bol. Serv. nac. Pesq. agron.
Boletim da Sociedade Broteriana, Coimbra	Bol. Soc. broteria.
Boletim da Superintêndencia dos Serviços do Café. São Paulo	Bol. Suptda. Serv. Café, S. Paulo
Boletim Técnico Instituto Agronomico del Norte	Bol. téc. Inst. agron. Norte
Boletim Técnico Instituto de Cacau da Bahia	Bol. téc. Inst. Cacau Bahia
Boletín de la Estación Experimental Agrícola de la Molina	Bol. Estac. exp. agríc. La Molina
Boletín de la Estación Experimental Agrícola de Puerto Rico	Bol. Estac. exp. agríc. PR
Boletín de la Estación Experimental Agrícola de Tucumán	Bol. Estac. exp. agríc. Tucumán
Boletín de la Estación Experimental Agronómica de Cuba	Bol. Estac. exp. agron. Cuba
Boletín del Instituto Nacional de Investigaciones Agronómicas, Madrid	Bol. Inst. Invest. agron., Madr.
Boletín Oficial de la Asociación de Técnicos Azucareros de Cuba	Bol. Asoc. Téc. azuc. Cuba
Boletín de Producción y Fomento Agrícolo, Buenos Aires	Bol. Prod. Fom. agríc., B. Aires
*Boletín de la Sociedad Argentina de Botánica	Bol. Soc. argent. Bot.
Boletín Técnico. Facultad de Ciencias Agrarias, Universidad Nacional de Cuyo	Bol. téc. Fac. Cienc. agrar. Univ. Cuyo
Boletín Técnico, Ministerio de Agricultura, Chile	Bol. téc. Minist. Agric. Chile
Bollettino della Stazione di Patologia Vegetale, Roma	Boll. Staz. Pat. veg. Roma
Bondevennen	Bondevennen
Botaničeskiĭ Žurnal (Botanical Journal), Moscow	Bot. Ž. (Bot. J.), Moskva
*Botaničniĭ Žurnal (Botanical Journal) Kiïv	Bot. Ž. (Bot. J.), Kiïv
*Botanical Gazette, Chicago	Bot. Gaz.
*Botanical Museum Leaflets, Harvard	Bot. Mus. Leafl. Harv.
*Botanical Review	Bot. Rev.
*Botanisk Tidsskrift, Kjøbenhavn	Bot. Tidsskr.
*Botaniska Notiser, Lund	Bot. Notiser
Bragantia, São Paulo	Bragantia
Brewers' Guild Journal	Brew. Guild J.
British Agricultural Bulletin	Brit. agric. Bull.
British Journal of Experimental Biology	Brit. J. exp. Biol.
*British Journal of Radiology	Brit. J. Radiol.
British Sugar Beet Review	Brit. Sug. Beet Rev.
*Brittonia, New York	Brittonia
*Brotéria	Brotéria
Buletinul Tutunului, Bucureşti	Bul. Tutun.
Bulletin Agricole	Georgikon Deltion (Agric. Bull.)/Bull. Agric., Athens
Bulletin Agricole du Congo Belge, Bruxelles	Bull. agric. Congo belge
Bulletin Agricole, Tananarive	Bull. agric. Tananarive
Bulletin Agronomique, Ministère de la France d' Outre Mer	Bull. agron. Fr. d'out. mer

Bulletin of the Alabama Agricultural Experiment Station	Bull. Ala. agric. Exp. Sta.
Bulletin of the Arizona Agricultural Experiment Station	Bull. Ariz. agric. Exp. Sta.
Bulletin of the Arkansas Agricultural Experiment Station	Bull. Ark. agric. Exp. Sta.
Bulletin of the Barbados Department of Agriculture ..	Bull. Barbados Dept. Agric.
Bulletin of the Barley Improvement Institute, Winnipeg	Bull. Barley Impr. Inst.
Bulletin of the Botanical Society of Bengal	Bull. bot. Soc. Beng.
Bulletin of the British West Indies Central Sugar Cane Breeding Station	Bull. Brit. W. Ind. Sug. Cane Sta.
Bulletin of the California Agricultural Experiment Station	Bull. Calif. agric. Exp. Sta.
Bulletin of the Canterbury Malting Co. of New Zealand ..	Bull. Canterbury Malt. Co. NZ
Bulletin of the Coffee Board, Kenya	Bull. Coffee Bd., Kenya
Bulletin of the College of Agriculture, Utsunomiya University	Utsunomiya Daigaku Nogakubu Gakujutsu Hokoku/Bull. Coll. Agric. Utsunomiya Univ.
Bulletin of the Connecticut Agricultural Experiment Station	Bull. Conn. agric. Exp. Sta.
Bulletin of the Connecticut (Storrs) Experiment Station	Bull. Conn. (Storrs) Exp. Sta.
Bulletin of the Cornell University Agricultural Experiment Station	Bull. Cornell agric. Exp. Sta.
Bulletin of the Council for Scientific and Industrial Research, Melbourne	Bull. Coun. sci. industr. Res. Aust.
Bulletin of the Delaware College Agricultural Experiment Station, Newark	Bull. Del. agric. Exp. Sta.
Bulletin of the Department of Agriculture, Jamaica ..	Bull. Dep. Agric. Jamaica
Bulletin of the Department of Agriculture, Union of South Africa	Bull. Dep. Agric. S. Afr.
Bulletin of the Department of Science and Agriculture, Barbados	Bull. Dep. Sci. Agric. Barbados
Bulletin of the Edinburgh College of Agriculture.. ..	Bull. Edinb. Coll. Agric.
Bulletin of the Faculty of Agriculture of the Fouad I University, Egypt	Bull. Fac. Agric. Fouad I Univ.
Bulletin of the Faculty of Agriculture of Kagoshima University	Kogoshima Daigaku Nogakubu Gakujutsu Hokoku/Bull. Fac. Agric. Kogoshima Univ.
Bulletin of the Faculty of Agriculture of Shinshu University	Shinshu Daigaku Nogakubu Gakujutsu Hokoku/Bull. Fac. Agric. Shinshu Univ.
Bulletin of the Faculty of Science, the Fouad I University, Egypt	Bull. Fac. Sci. Fouad I Univ.
Bulletin of the Florida Agricultural Experiment Station, Gainesville	Bull. Fla. agric. Exp. Sta.
Bulletin of the Forestry Commission, London	Bull. For. Comm., Lond.
Bulletin of the Georgia Experiment Station	Bull. Ga. Exp. Sta.
Bulletin of the Hawaii Agricultural Experiment Station	Bull. Hawaii agric. Exp. Sta.
*Bulletin Horticole, Liège	Bull. Hort., Liège
Bulletin of the Horticultural Division Tokai-Kinki Agricultural Experiment Station	Tokai Kinki Nogyo Shikenjo Engeibu Kenkyu Hokoku/Bull. Hort. Div. Tokai-Kinki agric. Exp. Sta.
Bulletin of the Idaho Agricultural Experiment Station ..	Bull. Idaho agric. Exp. Sta.
Bulletin of the Illinois Agricultural Experiment Station, Urbana	Bull. Ill. agric. Exp. Sta.
Bulletin of the Indian Central Jute Committee	Bull. Indian cent. Jute Comm.
Bulletin of the Indian Coffee Board	Bull. Indian Coff. Bd.
Bulletin of the Indiana Agricultural Experiment Station	Bull. Ind. agric. Exp. Sta.
Bulletin d'Information de l'Institut National pour l'Étude Agronomique du Congo Belge	Bull. INEAC

Bulletin de l'Institut Agronomique et des Stations de Recherches de Gembloux	Bull. Inst. agron. Gembloux
Bulletin de l'Institut de Botanique, Sofia	Izv. bot. Inst. (Bull. bot. Inst.)/Bull. Inst. bot., Sofia
Bulletin de l'Institut Microbiologie de l'Académie Bulgare des Sciences, Sofia	Izv. Mikrobiol. Inst. (Bull. Microbiol. Inst.)/Bull. Inst. Microbiol. Acad. bulg. Sci., Sofia
Bulletin of the Institute of Agricultural Research of Tohoku University	Nogaku Kenkyusho Iho/Bull. Inst. agric. Res. Tohoku Univ.
Bulletin International de l'Académie des Sciences et des Lettres de Cracovie	Bull. int. Acad. Cracovie
Bulletin of the Iowa Agricultural Experiment Station ..	Bull. Ia. agric. Exp. Sta.
*Bulletin du Jardin Botanique de l'État à Bruxelles ..	Bull. Jard. bot. Brux.
Bulletin of the Kansas Agricultural Experiment Station	Bull. Kans. agric. Exp. Sta.
Bulletin of the Kentucky Agricultural Experiment Station	Bull. Ky. agric. Exp. Sta.
Bulletin of the Kyushu Agricultural Experiment Station	Kyushu Nogyo Shikenjo Iho/Bull. Kyushu agric. Exp. Sta.
Bulletin of the Louisiana Agricultural Experiment Station	Bull. La. agric. Exp. Sta.
Bulletin of the Maine Agricultural Experiment Station	Bull. Me. agric. Exp. Sta.
Bulletin of the Maryland Agricultural Experiment Station	Bull. Md. agric. Exp. Sta.
Bulletin of the Massachusetts Agricultural Experiment Station	Bull. Mass. agric. Exp. Sta.
Bulletin of the Mauritius Institute	Bull. Mauritius Inst.
Bulletin of the Mauritius Sugar Cane Research Station, Réduit	Bull. Mauritius Sug. Res. Sta.
Bulletin of the Ministry of Agriculture and Fisheries, London	Bull. Minist. Agric., Lond.
Bulletin of the Minnesota Agricultural Experiment Station	Bull. Minn. agric. Exp. Sta.
Bulletin of the Mississippi Agricultural Experiment Station	Bull. Miss. agric. Exp. Sta.
Bulletin of the Missouri Agricultural Experiment Station	Bull. Mo. agric. Exp. Sta.
Bulletin of the Montana Agricultural Experiment Station	Bull. Mont. agric. Exp. Sta.
Bulletin of the Nagano College of Agriculture.. ..	Nagano Norin Semmongakko Gakujutsu Hokoku/Bull. Nagano Coll. Agric.
Bulletin of the National Institute of Agricultural Sciences	Nogyo Gijutsu Kenkyusho Hokoku/ Bull. Nat. Inst. agric. Sci.
Bulletin of the Nebraska Agricultural Experiment Station	Bull. Neb. agric. Exp. Sta.
Bulletin of the Nevada Agricultural Experiment Station	Bull. Nev. agric. Exp. Sta.
Bulletin of the New Hampshire Agricultural Experiment Station	Bull. NH agric. Exp. Sta.
Bulletin of the New Jersey Agricultural Experiment Station	Bull. NJ agric. Exp. Sta.
Bulletin of the New Mexico Agricultural Experiment Station	Bull. N. Mex. agric. Exp. Sta.
Bulletin of the New York State Agricultural Experiment Station	Bull. NY St. agric. Exp. Sta.
Bulletin of the North Carolina Agricultural Experiment Station	Bull. NC agric. Exp. Sta.
Bulletin of the North Dakota Agricultural Experiment Station	Bull. N. Dak. agric. Exp. Sta.
Bulletin of the Oklahoma Agricultural Experiment Station	Bull. Okla. agric. Exp. Sta.

Bulletin of the Ontario Department of Agriculture	Bull. Ont. Dep. Agric.
Bulletin of the Oregon Agricultural Experiment Station	Bull. Ore. agric. Exp. Sta.
Bulletin of the Pennsylvania Agricultural Experiment Station	Bull. Pa. agric. Exp. Sta.
Bulletin of the Porto Rico Agricultural Experiment Station	Bull. PR agric. Exp. Sta.
Bulletin of the Research Council of Israel	Bull. Res. Counc. Israel
Bulletin of the Rhode Island Agricultural Experiment Station	Bull. RI agric. Exp. Sta.
Bulletin of the Royal Agricultural Society, Egypt	Bull. roy. agric. Soc. Egypt
Bulletin Scientifique, Ministère de la France d'Outre Mer	Bull. Sci. Fr. d'out. mer
Bulletin du Service Botanique et Agronomique de Tunisie	Bull. Serv. bot. Tunis
*Bulletin de la Société Botanique de France	Bull. Soc. bot. Fr.
*Bulletin de la Société Portugaise des Sciences Naturelles	Bull. Soc. portug. Sci. nat.
Bulletin of the South Carolina Agricultural Experiment Station	Bull. SC agric. Exp. Sta.
Bulletin of the South Dakota Agricultural Experiment Station	Bull. S. Dak. agric. Exp. Sta.
Bulletin of the Sudan Ministry of Agriculture	Bull. Sudan Minist. Agric.
Bulletin of the Tea Research Institute of Ceylon	Bull. Tea. Res. Inst. Ceylon
Bulletin Technique d'Information des Ingénieurs des Services Agricoles, Paris	Bull. tech. Ing. Serv. agric.
Bulletin of the Tennessee Agricultural Experiment Station	Bull. Tenn. agric. Exp. Sta.
Bulletin of the Texas Agricultural Experiment Station	Bull. Tex. agric. Exp. Sta.
*Bulletin of the Torrey Botanical Club, New York	Bull. Torrey bot. Cl.
Bulletin de l'Union des Agriculteurs d'Égypte	Bull. Un. Agric. Égypte
Bulletin of the Utah Agricultural Experiment Station	Bull. Utah agric. Exp. Sta.
Bulletin of the Vermont Agricultural Experiment Station	Bull. Vt. agric. Exp. Sta.
Bulletin of the Virginia Agricultural Experiment Station	Bull. Va. agric. Exp. Sta.
Bulletin of the Virginia Polytechnic Institute	Bull. Va. polyt. Inst.
Bulletin of the Washington State Agricultural Experiment Station	Bull. Wash. St. agric. Exp. Sta.
Bulletin of the West Virginia Agricultural Experiment Station	Bull. W. Va. agric. Exp. Sta.
Bulletin of the Wisconsin Agricultural Experiment Station	Bull. Wis. agric. Exp. Sta.
Bulletin of the Wyoming Agricultural Experiment Station	Bull. Wyo. agric. Exp. Sta.
Bulletin of the Yamagata Agricultural College (Agricultural Science)	Yamagata Kenritsu Norin Semmon Gakko Kenkyu Hokoku/Bull. Yamagata Agric. Coll.
Cacao Information Bulletin, Costa Rica	Cacao Inform. Bull.
Cahiers de Recherches Agronomiques (Maroc) Rabat	Cah. Rech. agron., Rabat
*Caldasia	Caldasia
California Agriculture	Calif. Agric.
*Campesino, Santiago	Campesino, Santiago
Canadian Grain Journal	Canad. Grain J.
Canadian Journal of Agricultural Science	Canad. J. agric. Sci.
Canadian Journal of Botany	Canad. J. Bot.
Canadian Journal of Technology	Canad. J. Technol.
Cane Growers' Quarterly Bulletin, Brisbane	Cane Gr. quart. Bull.
*Canner	Canner
Caribbean Forester, Puerto Rico	Caribbean For.
Caryologia	Caryologia
*Cellule, Louvain	Cellule
Cereal Chemistry, St. Paul	Cereal Chem.

Ceres	Ceres, Minas Gerais
Ceylon Coconut Quarterly	Ceylon Cocon. Quart.
Ceylon Journal of Science	Ceylon J. Sci.
Chemistry and Industry, London	Chem. & Ind.
*Chromosoma	Chromosoma
Chronica Botanica	Chron. bot.
*Chronica Naturae	Chron. nat.
*Ciencia e Investigación	Cienc. e Invest.
Ciencia, México	Ciencia, Méx.
Cinchona	Cinchona
Circular, California Agricultural Experiment Station	Circ. Calif. agric. Exp. Sta.
Circular, Delaware Agricultural Experiment Station	Circ. Del. agric. Exp. Sta.
Circular, Hawaii Agricultural Experiment Station	Circ. Hawaii agric. Exp. Sta.
Circular, Illinois State Natural History Survey	Circ. Ill. St. nat. Hist. Surv.
Circular, Indiana Agricultural Experiment Station	Circ. Ind. agric. Exp. Sta.
Circular, Kansas Agricultural Experiment Station	Circ. Kans. agric. Exp. Sta.
Circular, Mississippi Agricultural Experiment Station	Circ. Miss. agric. Exp. Sta.
Circular, Montana Agricultural Experiment Station	Circ. Mont. agric. Exp. Sta.
Circular, Oklahoma Agricultural Experiment Station	Circ. Okla. agric. Exp. Sta.
Circular, Porto Rico Agricultural Experiment Station	Circ. PR agric. Exp. Sta.
Circular, South Dakota Agricultural Experiment Station	Circ. S. Dak. agric. Exp. Sta.
Circular, Tennessee Agricultural Experiment Station	Circ. Tenn. agric. Exp. Sta.
Circular, United States Department of Agriculture	Circ. US Dep. Agric.
Circular, University of Idaho Agricultural Experiment Station	Circ. Univ. Idaho agric. Exp. Sta.
Circular, Wisconsin Agricultural Experiment Station	Circ. Wis. agric. Exp. Sta.
Cold Spring Harbor Symposia on Quantitative Biology	Cold Spr. Harb. Symp. quant. Biol.
Colonial Development	Colon. Developm.
Colonial Plant and Animal Products	Colon. Pl. Anim. Prod.
Colorado Farm Bulletin	Colo. Fm. Bull.
Commonwealth Agriculturist, Melbourne	Commonw. Agric.
*Comptes Rendus, Académie des Sciences de Paris	CR Acad. Sci., Paris
Comptes Rendus des Séances de l'Académie d'Agriculture de France	CR Acad. Agric. Fr.
*Comptes Rendus de la Société de Biologie, Paris	CR Soc. Biol., Paris
Comptes Rendus des Travaux du Laboratoire Carlsberg, Copenhagen	CR Lab. Carlsberg
Contributions from the Boyce Thompson Institute	Contr. Boyce Thompson Inst.
*Contributions from the Brooklyn Botanic Garden	Contr. Brooklyn bot. Gdn.
*Coton et Fibres Tropicales, Paris	Cot. et Fibr. trop.
Countryman, Nicosia	Countryman, Nicosia
Courrier Horticole	Courr. hort.
Current Science, Mysore	Curr. Sci.
*Curtis's Botanical Magazine	Curtis's bot. Mag.
Cytologia, Tokyo	Cytologia, Tokyo
*Dansk Botanisk Arkiv	Dansk bot. Ark.
*Dansk Skovforeningens Tidsskrift	Dansk Skovforen. Tidsskr.
Deutsche Landwirtschaft, Berlin	Dtsch. Landw., Berl.
Discovery, London	Discovery
*Dissertation Abstracts	Diss. Abstr.
*Doklady Akademii Nauk SSSR	Dokl. Akad. Nauk SSSR (Proc. Acad. Sci. USSR)
*Doklady Vsesojuznoĭ Akademii Seljskohozjaĭstvennyh Nauk imeni V.I. Lenina, Moscow	Dokl. Akad. seljskohozjaĭstv. Nauk Lenin (Proc. Lenin Acad. agric. Sci.)
East African Agricultural Journal, Nairobi	E.Afr. agric. J.
*Ecological Monographs	Ecol. Monogr.

Ecological Review	Seitaigaku Kenkyu/Ecol. Rev.
*Ecology	Ecology
Economic Botany, New York	Econ. Bot.
Economic Proceedings of the Royal Dublin Society	Econ. Proc. R. Dublin Soc.
Egyptian Agricultural Journal	Mujall. Zira'. Misr. (J. Egypt. Agric.)
*El Aliso	El Aliso
Empire Cotton Growing Review, London	Emp. Cott. Gr, Rev.
Empire Forestry Review, London	Emp. For. Rev.
Empire Journal of Experimental Agriculture, Oxford	Emp. J. exp. Agric.
Endeavour	Endeavour
Erfelijkeid in Praktijk	Erfelijkh. i. Prakt.
Ernährung der Pflanze	Ernähr. Pfl.
Euclides, Madrid	Euclides, Madr.
Euphytica	Euphytica, Wageningen
*Evolution, New York	Evolution, NY
Experientia, Basel	Experientia
Experimenta, Mendoza	Experimenta
*Experimental Cell Research	Exp. Cell Res.
Fachliche Mitteilungen der Österreichischen Tabakregie	Fachl. Mitt. öst. Tabakregie
Farm and Forest, Ibadan	Fm. & For.
Farm and Home Science, Utah	Fm. Home Sci.
Farm Research, New York	Fm. Res.
Farmer (The), Kingston	Farmer, Kingston, Jam.
Farmers' Bulletin, Department of Agriculture, Washington	Fmrs'. Bull. Dept. Agric. Wash.
Farming in South Africa, Pretoria	Fmg. in S. Afr.
*Flora, Jena	Flora, Jena
Flygblad fran Statens Växtskyddsanstalt	Flygbl. Växtskyddanst.
Folia Biologica, Buenos Aires	Folia biol., B. Aires
Folia Universitaria Cochabamba	Folia univ., Cochabamba
Folleto de Divulgación, Secretaría de Agricultura y Ganadería, México	Foll. Divulg. Secretaría Agric. Ganad., Méx.
Folleto Misceláneo, Secretaría de Agricultura y Ganadería, México	Foll. Misc. Secretaría Agric. Ganad., Méx.
Folleto Técnico, Secretaría de Agricultura y Ganadería, México	Foll. téc. Secretaría Agric. Ganad., Méx.
Foreign Agriculture	Foreign Agric.
Forestry, London	Forestry
Forêt et Conservation	Forêt et Conserv.
Forsknings och Försögsresultat, Helsinki	Forskn.- o. FörsResult., Helsink.
Forskning og Forsøk i Landbruket	Forskn. Fors. Landbr.
Försök och Forskning	Försök o. Forskn.
*Forstlige Forsøgsvæsen i Danmark	Forstl. Forsøksv. Danm.
Fruit Varieties and Horticultural Digest	Fruit Var. hort. Dig.
Fruitteelt, Arnhem	Fruitteelt
Fruktodlaren	Fruktodlaren
Fukien Agricultural Journal	Fukien agric. J.
*Gardeners' Chronicle	Gdnrs'. Chron.
Gartenbauwissenschaft	Gartenbauwiss.
Gazeta do Agricultor, Moçambique	Gaz. Agric. Moçamb.
Genetica Agraria, Roma	Genet. agr.
*Genetica, 's-Gravenhage	Genetica
Genetica Iberica	Genet. iber.
Genetics	Genetics

*Gentes Herbarum, Ithaca	Gentes Herb., Ithaca
*Giornale di Agricoltura della Domenica	G. Agric. Domen.
Glasnik Biološke Sekcije, Zagreb	Glsn. biol. Sekc., Zagreb
Godišen Zbornik na Zemjodelsko-Šumarskiot Fakultet na Univerzitetot, Skopje	God. Zborn. zemjodel.-šumarsk. Fak. Univ., Skopje (Ann. Rep. Fac. Agric. For. Univ. Skopje)
Godišnjak Biološkog Instituta u Sarajevu	God. biol. Inst. Sarajevu
Godišnjak Poljprivredno-Šumarskog Fakulteta Univerziteta Beogradu	God. Poljprivred.-Šumarsk. Fak. Univ. Beogradu
*Growth	Growth
Hassadeh, Tel-Aviv	Sadeh (Field)/Hassadeh
Hawaii Farm Science	Hawaii Fm. Sci.
Hawaiian Planters Record	Hawaii. Plant. Rec.
Hedeselskabets Tidsskrift, Aarhus	Hedeselsk. Tidsskr., Aarhus
*Hereditas, Lund	Hereditas, Lund
Heredity	Heredity
Herefordshire Agricultural Journal	Herefordsh. agric. J.
Hilgardia	Hilgardia
Hlopkovodstvo	Hlopkovodstvo (Cott. raising)
Hoja Informativa. Instituto de Fitotecnia, Buenos Aires	Hoja Inst. Fitotecn., B. Aires
Horticultural News, New Jersey	Hort. News, NJ
*Humus	Humus
Hungarian Agricultural Review	Hungar. agric. Rev.
Idaho Agricultural Science	Idaho agric. Sci.
Idia	Idia
Indian Central Cotton Committee	Indian cent. Cott. Comm.
Indian Central Jute Committee. Agricultural Research Bulletin	Indian cent. Jute Comm. agric. Res. Bull.
Indian Cotton Growing Review	Indian Cott. Gr. Rev.
Indian Farming	Indian Fmg.
Indian Journal of Agricultural Science	Indian J. agric. Sci.
Indian Journal of Genetics and Plant Breeding	Indian J. Genet.
*Indian Journal of Horticulture	Indian J. Hort.
*Indonesian Journal of Natural Science	Indonesian J. nat. Sci.
Información Técnica. Ministerio de Agricultura, División de Investigación, Bogotá	Informac. téc. Min. Agric. Bogotá
Interagra	Interagra
*International Sugar Journal	Int. Sug. J.
Iowa Farm Science	Iowa Fm. Sci.
Iowa State College Journal of Science	Iowa St. Coll. J. Sci.
Italia Agricola	Ital. agric.
Izvestija Akademii Nauk SSSR	Izv. Akad. Nauk SSSR (News Acad. Sci. USSR)
Japanese Journal of Breeding	Ikushugaku Zasshi/Jap. J. Breeding
Japanese Journal of Genetics	Idengaku Zasshi/Jap. J. Genet.
Journal of Agricultural Science, Cambridge	J. agric. Sci.
Journal of the Agriculural Society of Trinidad and Tobago	J. agric. Soc. Trin. Tobago
Journal of Agriculture and Food Chemistry	J. Agric. Food Chem.
Journal of Agriculture and Industry of South Australia, Adelaide	J. Agric. S. Aust.
Journal d'Agriculture Tropicale et de Botanique Appliquée	J. Agric. trop. Bot. appl.
Journal of Agriculture of the University of Puerto Rico	J. Agric. Univ. PR
Journal of Agriculture, Western Australia, Perth	J. Agric. W. Aust.

*Journal of the American Statistical Association	J. Amer. statist. Ass.
*Journal of the Arnold Arboretum	J. Arnold Arbor.
Journal of the Association of Official Agricultural Chemists, Washington	J. Ass. off. agric. Chem. Wash.
Journal of the Australian Institute of Agricultural Science	J. Aust. Inst. agric. Sci.
*Journal of Bacteriology, Baltimore	J. Bact.
Journal of Biological Chemistry	J. biol. Chem.
Journal of the British Grassland Society, Aberystwyth	J. Brit. Grassl. Soc.
*Journal of Cellular and Comparative Physiology	J. cell. comp. Physiol.
*Journal of the Chemical Society, London	J. chem. Soc.
Journal of the Department of Agriculture, Éire	J. Dep. Agric. Éire
Journal of the Department of Agriculture of New Zealand	J. Dep. Agric. NZ
Journal of the Department of Agriculture of South Australia	J. Dep. Agric. S. Aust.
Journal of the Department of Agriculture of the Union of South Africa	J. Dep. Agric. S. Afr.
Journal of the Department of Agriculture of Victoria, Australia	J. Dep. Agric. Vict.
Journal of the Department of Agriculture of Western Australia	J. Dep. Agric. W. Aust.
*Journal of Ecology	J. Ecol.
Journal of Economic Entomology	J. econ. Ent.
*Journal of the Elisha Mitchell Scientific Society	J. Elisha Mitchell sci. Soc.
Journal of Experimental Biology, Cambridge	J. exp. Biol.
Journal of Experimental Botany	J. exp. Bot.
Journal of the Faculty of Agriculture, Iwate University	Iwate Daigaku Nogakuba Hokoko/J. Fac. Agric. Iwate Univ.
Journal of the Faculty of Agriculture, Tottori University	J. Fac. Agric. Tottori Univ.
Journal of the Farmers' Club, London	J. Fmrs'. Cl., Lond.
*Journal of Forestry, Washington	J. For.
Journal of General Microbiology, London	J. gen. Microbiol.
Journal of General Physiology, Baltimore	J. gen. Physiol.
Journal of Genetics, Cambridge	J. Genet.
Journal of Heredity, Washington	J. Hered.
*Journal of the Horticultural Association of Japan	Engeigaku Kai Zasshi/J. hort. Ass. Japan
Journal of Horticultural Science	J. hort. Sci.
*Journal of the Indian Botanical Society, Bangalore	J. Indian bot. Soc.
Journal of the Indian Institute of Science	J. Indian Inst. Sci.
Journal of the Institute of Brewing, London	J. Inst. Brew.
Journal of the Institute of Corn and Agricultural Merchants	J. Inst. Corn Merch.
Journal of the Jamaican Association of Sugar Technologists	J. Jamaican Ass. Sug. Technol.
*Journal of the Linnean Society, London	J. Linn. Soc.
Journal of the Madras University	J. Madras Univ.
Journal of the National Institute of Agricultural Botany	J. nat. Inst. agric. Bot.
Journal and Proceedings of the Royal Society of New South Wales, Sydney	J. roy. Soc. NSW
Journal of Range Management	J. Range Mgmt.
Journal of the Royal Agricultural Society of England, London	J. R. agric. Soc.
Journal of the Royal Horticultural Society, London	J. R. hort. Soc.
Journal of the Royal Society of Arts, London	J. R. Soc. Arts
*Journal of the Royal Statistical Society, London	J. R. statist. Soc.
Journal of the Rubber Research Institute of Malaya	J. Rubb. Res. Inst. Malaya

Journal of Science and Food Agriculture, London	J. Sci. Fd. Agric.
*Journal of South African Botany	J. S. Afr. Bot.
Journal of the South African Forestry Association	J. S. Afr. For. Ass.
Journal of Sugarcane Research, Taiwan	Kanche Yenchiu/J. Sugar Cane Res.
Journal of the Textile Institute, Manchester	J. Text. Inst.
Journal of the University of Bombay	J. Univ. Bombay
*Journal of the Washington Academy of Sciences	J. Wash. Acad. Sci.
Journal of the West African Institute of Oil Palm Research	J. W. Afr. Inst. Oil Palm Res.
Jute Abstracts	Jute Abstr.
Kärntner Bauer	Kärntner Bauer
Kartoffelbau	Kartoffelbau
Kasikorn, Bangkok	Kasikon(r) (Farmer) Kasikorn, Bangkok
Kew Bulletin	Kew. Bull.
Koetoiminta ja Käytäntö, Helsinki	Koetoim. ja Käytäntö
Kolhoznoe Proizvodstvo	Kolhoz. Proizvod. (Collect. Fm. Prod.)
Kromosomo, Tokyo	Senshokutai (Chromosome)/Kromosomo
Ktavim, Rehovot	Ktavim, Rehovot
Kühn-Archiv	Kühn-Archiv
Kungliga Landtbruksakademiens Tidskrift, Stockholm	K. LantbrAkad. Tidskr.
Kungliga Lantbrukshögskolans Annaler, Uppsala	Kungl. LantbrHögskolans Ann.
Landbau-Forschung Völkenrode, Braunschweig	Landb.-Forsch., Völkenrode
Landbouw, Bogor	Landbouw, Bogor
Landbouwgids, Utrecht	Landbouwg., Utrecht
Landbouwkundig Tijdschrift, 's-Gravenhage	Landbouwk. Tijdschr., 's-Grav.
Landbouwvoorlichting	Landvouwvoorlichting
Landwirtschaft, Wien	Landwirtschaft
Landwirtschaftliche Forschung, Darmstadt	Landw. Forsch.
Landwirtschaftliches Jahrbuch für Bayern	Landw. Jb. Bayern
Landwirtschaftliches Jahrbuch der Schweiz, Bern	Landw. Jb. Schweiz
Lantmannen, Stockholm	Lantmannen, Stockholm
Latvijas PSR Zinātņu Akademijas Vestis	Latv. PSR Zināt. Akad. Vestis
Leaflet, Ministry of Agriculture, Northern Ireland	Leafl. Minist. Agric. N. Ire.
Leaflet, United States Department of Agriculture, Washington	Leafl. US Dep. Agric.
*Lesnoe Hozjaĭstvo	Les. Hoz. (Forestry)
Lighter, Ottawa	Lighter
Lloydia, Cincinnati	Lloydia
Maatalous, Helsinki	Maatalous
Maatalous ja Koetoiminta, Helsinki	Maatalous ja Koetoiminta
Maataloustieteellinen Aikakauskioja, Helsinki	Maataloust. Aikakausk.
Madras Agricultural Journal, Coimbatore	Madras agric. J.
*Madroño, San Francisco	Madroño, S. Francisco
Maine Farm Research	Maine Fm. Res.
Malayan Agricultural Journal	Malay. agric. J.
*Materiae Vegetabiles	Mater. veg.
Meddelanden, Lantbrukshögskolan Jordbruksförsöksanstalten, Norrtälje	Medd. LantbrHögsk. JordbrFörs-Anst., Norrtälje
Meddelanden från Statens Trädgårdsförsök, Alnarp	Medd. Trädgårdsförs. Alnarp
Meddelanden från Statens Växtskyddsanstalt, Stockholm	Medd. Växtskyddsanst. Stockh.
Mededeelingen. Directeur van de Tuinbouw. 's-Gravenhage	Meded. Dir. Tuinb.
Mededeelingen van het Instituut voor Suikerbietenteelt, Bergen-op-Zoom	Meded. Inst. Suikerbiet., Bergen-o.-Z.

Mededeelingen van het Instituut voor de Veredeling van Tuinbouwgewassen, Wageningen	Meded. Inst. Vered. TuinbGewass.
Mededeelingen van de Landbouwhoogeschool, Gent ..	Meded. LandbHoogesch. Gent
Mededeelingen van de Landbouwhoogeschool, Wageningen	Meded. LandbHoogesch., Wageningen
Mededeelingen Landbouwvoorlichtingsdienst, Den Haag	Meded. LandbVoorlDienst, Den Haag
Mededeelingen van het National Comité voor Brouwgerst, Wageningen	Meded. nat. Com. Brouwg.
Mededeelingen van de Tuinbouwvoorlichtingsdienst, 's-Gravenhage	Meded. TuinVoorlDienst.
Mededelingen van de Nederlandse Algemene Keuringsdienst voor Landbouwzaden en Aardappelpootgoed	Meded. Ned. Alg. Keuringsdienst Landbouwzaden Aardappelpootgoed
Melding fra Statens Forsøksgård på Møistad	Meld. Stat. Forsøksg. Møistad
Melding fra Statens Plantevern	Meld. St. Plantevern
Meldinger fra Norges Landbrukshøiskole, Oslo	Meld. Norg. LandbrHøisk.
Meldinger fra Statens Forsøksstasjoner i Plantekultur ..	Meld. St. ForsSta.
Melhoramento, Elvas	Melhoramento
Memoirs of the College of Agriculture of Kyoto University	Mem. Coll. Agric. Kyoto Univ.
Memoirs, Cornell University Agricultural Experiment Station, Ithaca, New York	Mem. Cornell agric. Exp. Sta.
Memoirs of the Faculty of Agriculture of Hokkaido University	Hokkaido Daigaku Nogakugu Hobun Kiyo/Mem. Fac. Agric. Hokkaido Univ.
Memoirs of the Faculty of Agriculture of Kagoshima University	Mem. Fac. Agric. Kagoshima Univ.
Memoirs of the Faculty of Agriculture of the National Taiwan University, Taipeh	Taiwan Tahsueh Nunghsuehyuan Yenchiu Paokao/Mem. Fac. Agric. nat. Taiwan Univ.
Memoirs of Hyogo Prefectural University of Agriculture, Sasayama	Hyogo Noka Daigaku Kiyo/Mem. Hyogo Univ. Agric.
Mémoires de l'Académie Polonaise des Science, Cracovie	Mém. Acad. Sci. Cracovie
Mémoires de l'Institut agronomique de l'Université catholique de Louvain	Mém. Inst. agron. Univ. Louvain
Mémoires de l'Institut d'Études Centrafricaines, Brazzaville	Mém. Inst. Étud. centrafr.
Memorias. Asociación de Técnicos Azucareros de Cuba	Mem. Asoc. Téc. azuc. Cuba.
Memorias del Ministerio de Agricultura e Industrias, San José	Mem. Minist. Agric. Indust. San José
Memórias da Sociedade Broteriana, Coimbra	Mem. Soc. broteriana, Coimbra
Memórias e Trabalhos. Centro de Investigação Científica Algodoeira, Lourenço Marques	Mem. Trab. Cnt. Invest. cient. Algod., Lourenço Marques
Memorie dell' Istituto Italiano di Idrobiologia Dott. Marco de Marchi. Milano	Mem. Ist. ital. Idrobiol. de Marchi
Mikrobiologija, Moskva	Mikrobiologija (Microbiology), Moskva
Miscellaneous Bulletin of the Imperial Council of Agricultural Research, Delhi	Misc. Bull. imp. Counc. agric. Res. India
Miscellaneous Publications, United States Department of Agriculture, Washington	Misc. Publ. US Dep. Agric.
Mississippi Farm Research	Miss. Fm. Res.
Mitteilungen der Biologischen Zentralanstalt für Land- und Forstwirtschaft, Berlin	Mitt. biol. ZentAnst. Berl.
Mitteilungen der Deutschen Landwirtschafts-gesellschaft, Berlin.	Mitt. dtsch. LandwGes.
Mitteilungen der Höheren Bundeslehr- und Versuchsanstalten für Wein- und Obstau, Klosterneuburg, für Gartenbau, Schönbrunn	Mitt. Klosterneuburg

Mitteilungen für die Schweizerische Landwirtschaft, Zürich-Oerlikon	Mitt. schweiz. Landw. Zürich-Oerlikon
*Mitteilungen der Schweizerischen Anstalt für das forstliche Versuchswesen	Mitt. schweiz. ZentAnst. forstl. Versuchsw.
Monthly Bulletin of the California State Department of Agriculture	Mon. Bull. Calif. Dep. Agric.
Monthly Report, Ministry of Agriculture, Northern Ireland	Mon. Rep. Minist. Agric. N. Ire.
*Mycologia	Mycologia
Mysore Agricultural Journal, Bangalore	Mysore agric. J.
Nachrichtenblatt der Biologischen Zentralanstalt, Braunschweig	NachrBl. biol. ZentAnst. Braunschweig
Nachrichtenblatt für den Deutschen Pflanzenschutzdienst	NachrBl. dtsch. PflSchDienst., Berl.
Nagpur Agricultural College Magazine	Nagpur agric. Coll. Mag.
National Agricultural Advisory Service Quarterly Review	NAAS quart. Rev.
National Horticultural Magazine	Nat. hort. Mag.
Natural and Applied Science Bulletin of Manila	Natural appl. Sci. Bull.
*Naturalist, London	Naturalist, Lond.
Nature, London	Nature, Lond.
Naturens Verden, Kjøbenhavn	Nat. Verd., Kbh.
Naturwissenschaften	Naturwissenschaften
*Nauka i Žiznj	Nauka i Žiznj (Science & Life), Moskva
Nebraska Experiment Station Quarterly	Neb. Exp. Sta. quart.
Netherlands Journal of Agricultural Science	Netherlands J. agric. Sci.
New Biology	New Biol.
New Commonwealth	New Commonw.
New Jersey Agriculture	NJ Agric.
*New Phytologist, Cambridge	New Phytol.
New Zealand Journal of Agriculture	NZ J. Agric.
New Zealand Journal of Forestry	NZ J. For.
New Zealand Journal of Science and Technology	NZ J. Sci. Tech.
News Letter of the FAO International Rice Commission	News Lett. FAO Internat. Rice Comm.
Nordisk Jordbrugsforskning, Kjøbenhavn	Nord. JordbrForskn.
Norsk Landbruk	Norsk Landbr.
Notas Agronómicas. Estación agrícola Experimental de Palmira	Notas agron. Estac. agríc. exp. Palmira
*Notes of the Royal Botanical Gardens, Edinburgh	Notes R. bot. Gdn. Edinb.
Növénytermelés, Budapest	Növénytermelés
Nuclear Science Abstracts	Nuclear Sci. Abstr.
Nuovi Annali Istituto Chimico-Agrario Sperimentale di Gorizia	Nuovi Ann. Ist. chim.-agrar. sper. Gorizia
*Nuovo Giornale Botanico Italiano	Nuovo G. bot. ital.
Nyasaland Agricultural Quarterly Journal	Nyasald. agric. quart. J.
Ochrana Rostlin	Ochr. Rost.
Ohio Farm and Home Research	Ohio Fm. Home Res.
Ohio Journal of Science	Ohio J. Sci.
*Oikos	Oikos
*Oléagineux, Paris	Oléagineux
*Olearia, Rome	Olearia
*Österreichische Botanische Zeitschrift	Öst. bot. Z.
Pacific Science, Honolulu	Pacif. Sci.
Pakistan Cotton Bulletin	Pakist. Cott. Bull.
*Pakistan Journal of Forestry	Pakist. J. For.
Pakistan Journal of Science	Pakist. J. Sci.

Palestine Journal of Botany. Jerusalem Series	Palest. J. Bot. Jerusalem
Palestine Journal of Botany. Rehovot Series	Palest. J. Bot. Rehovot
Pamphlet, Department of Agriculture, Tanganyika	Pamphl. Dep. Agric. Tanganyika
Papers of the Michigan Academy of Sciences	Pap. Mich. Acad. Sci.
Pflanzenschutzberichte, Wien	PflSchBer.
Philippine Agriculturist	Philipp. Agric.
Philippine Journal of Agriculture	Philipp. J. Agric.
*Philosophical Transactions of the Royal Society, London	Phil. Trans.
*Physiologia Plantarum	Physiol. Plant.
*Phytomorphology	Phytomorphology
Phyton	Phyton
*Phytopathologische Zeitschrift, Berlin	Phytopath. Z.
Phytopathology	Phytopathology
Plant Disease Reporter	Plant Dis. Reptr.
Plant Pathology	Plant Path.
*Plant Physiology	Plant Physiol.
Plant Protection Bulletin	Plant Prot. Bull.
Plant and Soil	Plant & Soil
*Planta	Planta
Planters Bulletin of the Rubber Research Institute of Malaya	RRI Plant. Bull.
Polish Technical Abstracts	Pol. Tech. Abstr.
Poljoprivredna Znanstvena Smotra, Zagreb	Poljopr. Znanst. Smot.
Pomme de Terre Française, Lille	Pomme d. Terre franç.
Poona Agricultural College Magazine	Poona agric. Coll. Mag.
Portugaliae Acta Biologica, Lisboa	Portug. acta biol.
Potato News from the Netherlands	Potato News Netherlands
Press Bulletin of the Alberta University Extension Department	Pr. Bull. Alberta Univ. Ext. Dep.
*Priroda, Leningrad	Priroda (Nature), Leningrad
*Proceedings of the American Academy of Arts and Sciences	Proc. Amer. Acad. Arts Sci.
*Proceedings of the American Philosophical Society, Philadelphia	Proc. Amer. phil. Soc.
*Proceedings of the American Pomological Society	Proc. Amer. pomol. Soc.
Proceedings of the American Society for Horticultural Science	Proc. Amer Soc. hort. Sci.
Proceedings of the American Society of Sugar Beet Technologists	Proc. Amer. Soc. Sug. Beet Tech.
*Proceedings of the Association of Official Seed Analysts of North America	Proc. Ass. off. Seed Anal. N. Amer.
Proceedings of the Association of Southern Agricultural Workers, USA	Proc. Ass. Sth. agric. Wkrs.
Proceedings of the Bihar Academy of Agricultural Science	Proc. Bihar Acad. agric. Sci.
Proceedings of the British West Indies Sugar Technologists	Proc. Brit. W. Ind. Sugar. Tech.
Proceedings of the Canadian Phytopathological Society	Proc. Canad. phytopath. Soc.
Proceedings of the Crop Science Society of Japan	Nihon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Japan)
Proceedings of the Egyptian Academy of Sciences	Proc. Egypt. Acad. Sci.
Proceedings of the Florida State Horticultural Society	Proc. Fla. hort. Soc.
Proceedings of the Helminthological Society of Washington	Proc. helm. Soc. Wash.
*Proceedings of the Imperial Academy of Japan	Proc. imp. Acad. Japan
Proceedings of the Indian Academy of Sciences, Bangalore	Proc. Indian Acad. Sci.
Proceedings of the International Seed Testing Association	Proc. int. Seed Test. Ass.

Proceedings of the International Society of Sugar Cane Technologists	Proc. int. Soc. Sug. Cane Tech.
Proceedings of the Iowa Academy of Sciences	Proc. Iowa Acad. Sci.
*Proceedings of the Leeds Philosophical and Literary Society	Proc. Leeds phil. lit. Soc.
*Proceedings of the Linnean Society, London	Proc. Linn. Soc. Lond.
*Proceedings of the Linnean Society, New South Wales ..	Proc. Linn. Soc. NSW
Proceedings of the National Academy of Sciences, India	Proc. nat. Acad. Sci. India
*Proceedings of the National Academy of Sciences, Washington	Proc. nat. Acad. Sci. Wash.
Proceedings of the National Institute of Sciences of India	Proc. nat. Inst. Sci. India
Proceedings of the New York State Horticultural Society	Proc. NY St. hort. Soc.
Proceedings of the Ohio Horticultural Society	Proc. Ohio hort. Soc.
Proceedings of the Ohio Vegetable Growers' Association	Proc. Ohio Veg. Gr. Ass.
Proceedings of the Queensland Society of Sugar Technologists	Proc. Qd. Soc. Sug. Tech.
Proceedings of the Royal Society, London	Proc. roy. Soc.
*Proceedings of the Royal Society, Edinburgh	Proc. roy. Soc. Edinb.
Proceedings of the South African Sugar Cane Technologists	Proc. S. Afr. Sug. Cane Tech.
Proceedings of the Utah Academy of Science	Proc. Utah Acad. Sci.
Proceedings of the Washington State Horticultural Association	Proc. Wash. St. hort. Ass.
Proceedings of the West Virginia Academy of Sciences ..	Proc. W. Va. Acad. Sci.
*Progrès Agricole et Viticole	Progr. agric. vitic.
*Protoplasma	Protoplasma
Publications of the Department of Agriculture, Ottawa	Publ. Dep. Agric. Canada
Publications de l'Institut Belge pour l'Amélioration de la Betterave	Publ. Inst. belge Amélior. Better.
Publications de l'Institut National pour l'Étude Agronomique du Congo Belge	Publ. Inst. nat. agron. Congo belge
Publications of the Malt Research Institute of Madison ..	Publ. Malt Res. Inst., Madison
Pyrethrum Post	Pyrethrum Post
Quarterly Bulletin of the Michigan Agricultural Experiment Station	Quart. Bull. Mich. agric. Exp. Sta.
Quarterly Circular, Ceylon Rubber Research Scheme, Peradeniya	Quart. Circ. Ceylon Rubb. Res. Sch.
Quarterly Journal of Forestry, London	Quart. J. For.
*Quarterly Review of Biology, Baltimore	Quart. Rev. Biol.
Quarterly Review of the Royal Agricultural Society ..	Quart. Rev. R. agric. Soc.
Queensland Agricultural Journal	Qd. agric. J.
Queensland Journal of Agricultural Science	Qd. J. agric. Sci.
Radovi Poljoprivrednih naučno-Istraživačkih Ustanova	Rad. poljopriv. nauč.-Istraž. Ust., Beogr.
Radovi Poljoprivredno Šumarskog Fakulteta Univerziteta u Sarajevu	Rad. poljopriv.-Šumarsk. Fak. Univ. Sarajevu
Reclamation Era, Washington	Reclam. Era
Records of Researches of the Faculty of Agriculture of the University of Tokyo	Rec. Res. Fac. Agric. Univ. Tokyo
Report of the Faculty of Agriculture of Shizuoka University	Shizuoka Daigaku Nogakubu Kenkyu Hokoku/Rep. Fac. Agric. Shizuoka Univ.
Report of the Hokkaido National Agricultural Experiment Station	Hokkaido Nogyo Shikenjo Hokoku/ Rep. Hokkaido agric. Exp. Sta.
Report of Proceedings of the Northern Nut Growers' Association	Proc. Nth. Nut Gr. Ass.

Research Bulletin of the Idaho Agricultural Experiment Station	Res. Bull. Idaho agric. Exp. Sta.
Research Bulletin of the Iowa Agricultural Experiment Station	Res. Bull. Ia. agric. Exp. Sta.
Research Bulletin of the Nebraska Agricultural Experiment Station	Res. Bull. Neb. agric. Exp. Sta.
Research Bulletin of the Wisconsin Agricultural Experiment Station	Res. Bull. Wisc. agric. Exp. Sta.
Research and Farming, Raleigh	Res. & Fmg.
Research. Quarterly Review of the Rhode Island Agricultural Experiment Station, Kingston	Research, Kingston, RI
*Revista Agrícola, Guatemala	Rev. agríc., Guatemala
Revista de Agricultura, Cochabamba, Bolivia	Rev. Agric., Cochabamba
Revista de Agricultura, Piracicaba, Brazil	Rev. Agric., Piracicaba
Revista de Agricultura de São Paulo	Rev. Agric., S. Paulo
Revista Agronômica, Lisboa	Rev. agron., Lisboa
Revista Agronómica del Noroeste Argentino	Rev. agron. Noroest. argent.
Revista Argentina de Agronomía, Buenos Aires	Rev. argent. Agron.
Revista de la Facultad de Agronomía, Montevideo	Rev. Fac. Agron. Montevideo
Revista de la Facultad de Agronomía y Veterinaria, Buenos Aires	Rev. Fac. Agron. B. Aires
Revista de la Facultad de Ciencias Agrarias, Mendoza	Rev. Fac. Cienc. agrar., Mendoza
Revista Facultad Nacional de Agronomía, Colombia	Rev. Fac. nac. Agron., Colombia
Revista Industrial y Agrícola de Tucumán	Rev. industr. agríc. Tucumán
Revista del Instituto Agrícola Catalán de San Isidro	Rev. Inst. agríc. catal.
Revista de Investigaciones Agrícolas, Buenos Aires	Rev. Invest. agríc. B. Aires
Revue Agricole de l'Ile Maurice	Rev. agric. Maurice
Revue Agricole de l'Ile de la Réunion	Rev. agric. Réunion
Revue Agricole de la Nouvelle Calédonie	Rev. agric. Nouv. Calédonie
Revue de l'Agriculture, Bruxelles	Rev. Agric., Brux.
*Revue de Cytologie et de Cytophysiologie Végétales, Paris	Rev. Cytol., Paris
*Revue Générale de Botanique, Paris	Rev. gén. Bot.
*Revue Horticole, Paris	Rev. hort., Paris
*Revue Horticole Suisse	Rev. hort. suisse
Revue d'Oka	Rev. Oka
*Revue Romande d'Agriculture, de Viticulture et d'Arboriculture	Rev. rom. Agric.
Rhodesia Agricultural Journal, Salisbury	Rhod. agric. J.
Rhodesian Tobacco Journal	Rhod. Tob. J.
*Rhodora	Rhodora
*Rice Journal	Rice J.
Riso (Il), Milano	Riso, Milano
Rivista di Agricoltura Subtropicale et Tropicale, Firenze	Riv. Agric. subtrop.
Rivista della Canapa	Riv. Canapa
Rivista di Ecologia, Perugia	Riv. Ecol.
Rivista di Frutticoltura, Ravenna	Riv. Fruttic.
Rivista della Ortoflorofrutticoltura Italiana, Firenze	Riv. Ortoflorofruttic. ital.
*Rivista di Viticoltura, Enologia ed Agraria, Conegliano	Riv. Vitic.
Roczniki nauk Rolniczych	Roczn. Nauk rol.
Rodriguesia	Rodriguesia
Rural Research in CSIRO, Melbourne	Rur. Res. CSIRO
Saatgutwirtschaft	Saatgutwirtschaft
*Sad i Ogorod	Sad i Ogorod (Gdn. & Veg. Gdn.)
*Saharnaja Promyšlennostj	Sahar. Promyšl. (Sug. Industr.)
Samvirke	Samvirke

Sborník Československé Akademie Zemědělských věd Praha	Sborn. čsl. Acad. zeměd.
Sborník Vysoké Školy Zemědělské a Lesnické Fakulty, Brno	Sborn. vysoké Škol. zeměd. les. Brno
*Schriftenreihe der Forstlichen Fakultät der Universität Göttingen	SchrReihe. Forstl. Fak. Univ. Göttingen
Schweizerische Landwirtschaftliche Monatschefte ..	Schweiz. landw. Mh.
Schweizerische Landwirtschaftliche Zeitschrift "Die Grüne," Zürich	Schweiz. landw. Z.
*Schweizerische Zeitschrift für Obst- und Weinbau ..	Schweiz. Z. Obst- u. Weinb.
Science Bulletin, Department of Agriculture, Union of South Africa	Sci. Bull. Dep. Agric. S. Afr.
Science Bulletin of the Faculty of Agriculture, Kyushu University	Kyushu Daigaku Nogakubu Gakugei Zasshi/Sci. Bull. Fac. Agric. Kyushu Univ.
*Science and Culture, Calcutta	Sci. & Cult.
Science, Lancaster	Science
*Science Progress in the Twentieth Century, London ..	Sci. Progr. Twent. Cent.
Science Reports of the Matsuyama Agricultural College..	Sci. Rep. Matsuyama Agric. Coll.
Scientia Genetica, Torino	Sci. genet.
Scientific American	Sci. Amer.
Scientific Horticulture	Sci. Hort.
*Scientific Monthly, New York	Sci. Mon., NY
Scientific Proceedings of the Royal Dublin Society ..	Sci. Proc. R. Dublin Soc.
Scientific Reports of the Faculty of Agriculture of Okayama University	Okayama Daigaku Nogakubu Gakujutsu Hokoku/Sci. Rep. Fac. Agric. Okayama Univ.
Scientific Reports of the Saikyo University of Agriculture	Saikyo Daigaku Gakujutsu Hokoku, Nogaku/ Sci. Rep. Saikyo Univ., Agric.
Scientific Reports of the Tohoku University.	Sci. Rep. Inst. Res. Inst. Tohoku Univ.
Scottish Agriculture, Edinburgh	Scot. Agric.
Scottish Forestry	Scot. For.
Scottish Journal of Agriculture, Edinburgh	Scot. J. Agric.
Search, London	Search
Seed Trade Review	Seed Tr. Rev.
*Seed World	Seed World
*Skogen	Skogen
Socialističeskoe Seljskoe Hozjaĭstvo	Socialist. Seljsk. Hozjaĭstvo (Socialist. Agric.), Moscow
Socker Handlingar	Sock. Handl.
Soil Conservation, Washington	Soil Conserv.
Soil Science, Baltimore	Soil Sci.
*Solo (O)	Solo
*South African Journal of Science	S. Afr. J. Sci.
South African Sugar Journal	S. Afr. Sug. J.
Southern Seedsman	Sth. Seedsman
*Sovetskaja Agronomija	Sovetskaja Agronomija (Soviet Agronomy)
Soviet News	Soviet News
*Soybean Blue Book	Soybean Blue Bk.
*Soybean Digest, Hudson, Iowa	Soybean Dig.
Spisanie na Naučno-Izsledovatelskite Instituti pri Ministerstvata na Zemedelieto i Gorité	Spis. nauč.-izsled. Inst. Minist. Zemed. Gorité
Spisy Přírodovědeckou Fakultou University Karlovy ..	Spisy Přírodovědeck. Fak. Univ. Karlovy
Spreckels Sugar Beet Bulletin	Spreckels Sug. Beet Bull.
*Stain Technology	Stain Tech.

Studiekring voor Plantenveredeling, Verslag	StudKring. PlantVeredel., Wageningen. Versl.
Sudan Notes and Records	Sudan Notes
Sugar Beet Journal, Saginaw, Michigan	Sug. Beet J., Saginaw
Sugar Bulletin, Department of Agriculture, British Guiana	Sug. Bull., Georgetown
Sugar Bulletin, New Orleans	Sug. Bull., N. Orleans
Suo, Helsinki	Suo, Helsinki
Surinaamse Landbouw	Surinaam. Landb.
*Svensk Botanisk Tidskrift	Svensk bot. Tidskr.
Svensk Jordbruksforskning. Årsbok	Svensk JordbrForsk. Årsb.
*Svensk Papperstidning, Stockholm	Svensk PappTidn.
*Svenska Skogsvårdsföreningens Tidskrift, Stockholm ..	Svenska SkogsvFören. Tidskr.
Sveriges Pomologiska Forenings Årsskrift	Sverig. pomol. Foren. Årsskr.
*Sveriges Potatisodlares Riksförbund, Stockholm ..	Sverig. Potatisodl. Riksförb., Stockh.
Sveriges Utsädesförenings Tidskrift, Malmö	Sverig. Utsädesfören. Tidskr.
*Sydowia. Annales Mycologici	Sydowia
Symposia Genetica	Symp. genet.
T.C. Yüksek Ziraat Enstitüsü Çalışmalarından, Ankara	T.C. Yüksek Ziraat Enstitüsü Çalışmalarından, Ankara
Tabac (Le) Rome	Tabac
Tabacco (Il) Roma	Tabacco, Roma
Tabak	Tabak (Tobacco)
Tabakpflanzer Österreichs	Tabakpfl. Öst.
Taiwan Sugar Journal Quarterly	Taiwan Tangyeh Chikan/Taiwan Sug. J. Quart.
Taiwan Sugar Bulletin	Tai Tang Tungfan/Taiwan Sug. Bull.
Tasmanian Journal of Agriculture, Hobart	Tasm. J. Agric.
Tea Quarterly, Ceylon	Tea Quart.
Technical Bulletin of the Colorado Agricultural Experiment Station	Tech. Bull. Colo. agric. Exp. Sta.
Technical Bulletin of the Department of Agriculture, Uttar Pradesh, India	Tech. Bull. Dep. Agric. Uttar Pradesh
Technical Bulletin of the Georgia Agricultural Experiment Station	Tech. Bull. Ga. agric. Exp. Sta.
Technical Bulletin of the Hawaii Agricultural Experiment Station	Tech. Bull. Hawaii agric. Exp. Sta.
Technical Bulletin of the Kagawa-Ken Agricultural College	Kagawa Nogyo Semmongakko Kenkyu Hokoku/Tech. Bull. Kagawa Agric. Coll.
Technical Bulletin of the Kansas Agricultural Experiment Station	Tech. Bull. Kans. agric. Exp. Sta.
Technical Bulletin of the Massachusetts Agricultural Experiment Station	Tech. Bull. Mass. agric. Exp. Sta.
Technical Bulletin of the Michigan Agricultural Experiment Station	Tech. Bull. Mich. agric. Exp. Sta.
Technical Bulletin of the Minnesota Agricultural Experiment Station	Tech. Bull. Minn. agric. Exp. Sta.
Technical Bulletin of the Mississippi Agricultural Experiment Station	Tech. Bull. Miss. agric. Exp. Sta.
Technical Bulletin of the Missouri Agricultural Experiment Station	Tech. Bull. Mo. agric. Exp. Sta.
Technical Bulletin of the New Hampshire Agricultural Experiment Station	Tech. Bull. NH agric. Exp. Sta
Technical Bulletin of the New York State Agricultural Experiment Station	Tech. Bull. NY St. agric. Exp. Sta.

Technical Bulletin of the North Carolina Agricultural Experiment Station	Tech. Bull. NC agric. Exp. Sta.
Technical Bulletin of the Oklahoma Agricultural Experiment Station	Tech. Bull. Okla. agric. Exp. Sta.
Technical Bulletin of the Oregon Agricultural Experiment Station	Tech. Bull. Ore. agric. Exp. Sta.
Technical Bulletin of the South Dakota Agricultural Experiment Station	Tech. Bull. S. Dak. agric. Exp. Sta.
Technical Bulletin of the Taiwan Agricultural Research Institute	Tech. Bull. Taiwan agric. Res. Inst.
Technical Bulletin of the United States Department of Agriculture	Tech. Bull. US Dep. Agric.
Technical Bulletin of the Virginia Agricultural Experiment Station	Tech. Bull. Va. agric. Exp. Sta.
Technical Bulletin of the Washington Agricultural Experiment Station	Tech. Bull. Wash. agric. Exp. Sta.
Technical Papers of the South Pacific Commission	Tech. Pap. S. Pacif. Comm.
Technological Bulletin of the Indian Central Cotton Committee	Technol. Bull. Indian Cott. Comm.
Tennessee Farm and Home Science	Tenn. Fm. Home Sci.
*Terra e Sole, Roma	Terra e Sole
*Terre Marocaine	Terre maroc.
Tidskrift för Lantmän, Helsinki	Tidskr. Lantm., Helsinki
Tidsskrift for Frøavl	Tidsskr. Frøavl
Tidsskrift for Landøkonomi, Kjøbenhavn	Tidsskr. Landøkon.
Tidsskrift for det Norske Landbruk	Tidsskr. norske Landbr.
Tidsskrift for Planteavl, Kjøbenhavn	Tidsskr. Planteavl
Tijdschrift der Nederlandsche Heidemaatschappij	Tijdschr. ned. Heidemaatsch.
Tijdschrift over Plantenziekten, Wageningen	Tijdschr. PlZiekt.
*Tobacco, New York	Tobacco, NY
Tôhoku Journal of Agricultural Research	Tôhoku J. agric. Res.
Transactions of the American Association of Cereal Chemists	Trans. Amer. Ass. Cereal Chem.
*Transactions of the British Bryological Society	Trans. Brit. bryol. Soc.
*Transactions of the British Mycological Society	Trans. Brit. mycol. Soc.
Transactions of the Highland and Agricultural Society of Scotland	Trans. Highl. agric. Soc. Scot.
Transactions of the Illinois Agricultural Experiment Station	Trans. Ill. agric. Exp. Sta.
Transactions of the Illinois Horticultural Society	Trans. Ill. hort. Soc.
Transactions of the Illinois State Academy of Sciences	Trans. Ill. Acad. Sci.
Transactions of the Iowa State Horticultural Society	Trans. Iowa hort. Soc.
Transactions of the Kansas Academy of Science	Trans. Kans. Acad. Sci.
Transactions of the National Institute of Science, India	Trans. nat. Inst. Sci. India
*Transactions and Proceedings of the Botanical Society of Edinburgh	Trans. bot. Soc. Edinb.
*Transactions and Proceedings of the Royal Society of New Zealand	Trans. roy. Soc. NZ
*Transactions of the Royal Society of Edinburgh	Trans. roy. Soc. Edinb.
Transactions of the Tottori Society of Agricultural Science	Tottori Nogaku Kai Ho/Trans. Tottori Soc. Agric. Sci.
Tropical Agriculture, Trinidad	Trop. Agriculture, Trin.
Tropical Agriculturist, Peradeniya	Trop. Agriculturist
*Trudy Botaničskogo Instituta Akademii Nauk SSSR	Trudy Bot. Inst. Akad. Nauk SSSR (Trans. Bot. Inst. Acad. Sci. USSR)
Trudy Instituta Genetiki	Trud. Inst. Genet. (Trans. Inst. Genet.)
*Trudy Instituta Lesa	Trud. Inst. Lesa (Trans. Inst. For.)

Tuinbouwgids, s'-Gravenhage	Tuinbouwgids
Tunisie Agricole	Tunis. agric.
Turrialba	Turrialba
Unasylva	Unasylva
*UNESCO Bibliographical Newsletter	UNESCO Bibliogr. Newslett.
*UNESCO Monthly Circular	UNESCO Mon. Circ.
University of California Publications in Botany, Berkeley	Univ. Calif. Publ. Bot.
University of Queensland Papers of Department of Biology, Brisbane	Univ. Qd. Pap. Dep. Biol.
University of Wyoming Publications in Science	Univ. Wyo. Publ. Sci.
Uspehi Sovremennoĭ Biologii	Uspehi Sovrem. Biol. (Advanc. in Mod. Biol.)
Vakblad voor Biologen	Vakbl. Biol.
Valtion Maatalouskoetoiminnan Julkaisuja, Helsinki	Valt. Maatalousk. Julk.
Valtion Maatalouskoetoiminnan Tiedonantoja, Helsinki	Valt. Maatalousk. Tiedon.
Växtodling, Uppsala	Växtodling
Växtskyddsnotiser	Växtskyddsnotiser
*Vegetatio. Acta Geobotanica. Den Haag	Vegetatio, Haag
Veröffentlichungen der Bundesanstalt für Alpine Landwirtschaft in Admont	Veröff. Bundesanst. alp. Landw. Admont
Verslagen van Landbouwkundige Onderzoekingen der Rijkslandbouwproefstation	Versl. RijkslandbProefst., 's Grav.
Vestnik Akademii Nauk SSSR	Vestn. Akad. Nauk SSSR (Rec. Acad. Sci. USSR)
*Vinodelie i Vinogradarstvo SSSR	Vinodelie Vinogradarstvo SSSR (Winemak. & Vitic. USSR)
Virginia Journal of Science	Virginia J. Sci.
Wallerstein Laboratories Communications	Wallerstein Labs. Commun.
Watsonia	Watsonia
Weibulls Allehanda	Weibulls Allehanda
What's New in Crops and Soils	What's New Crops Soils
Windmill	Windmill, The Hague
Wissenschaftliche Zeitschrift der Humboldt-Universität, Berlin	Wiss. Z. Humboldt-Univ. Berlin
Worcestershire County Council Agricultural Quarterly Chronicle	Worcs. agric. quart. Chron.
World Crops	World Crops
Za Socialističeskuju Seljskohozjaĭstvennuju Nauku, Praha	Za socialist. seljskohozjaĭstv. Nauk. (For socialist agric. Sci.), Praha
Za Socialistické Zemědelství, Praha	Za Socialist. zeměd.
Zaštita Bilja	Zaštita Bilja
Zeitschrift für Acker- und Pflanzenbau, Berlin	Z. Acker- u. PflBau.
*Zeitschrift für Botanik	Z. Bot.
Zeitschrift für Forstgenetik und Forstpflanzenzüchtung	Z. Forstgen. Forstpflanzenz.
Zeitschrift für Induktive Abstammungs- und Vererbungslehre	Z. indukt. Abstamm.- u. VererbLehre
Zeitschrift für Pflanzenbau und Pflanzenschutz	Z. PflBau.
Zeitschrift für Pflanzenernährung und Düngung	Z. PflErnähr. Düng.
*Zeitschrift für Pflanzenkrankheiten (Pflanzenpathologie) und Pflanzenschutz	Z. PflKrankh.

Zeitschrift für Pflanzenzüchtung	Z. Pflanzenz.
Zemledelie	Zemledelie (Agriculture)
Zemljište i Biljka	Zemljište i Biljka
Züchter	Züchter
Žurnal Obščeĭ Biologii	Ž. obšč. Biol. (J. gen. Biol.), Moskva

Plant Breeding Abstracts

Vol. XXV, No. 1

*STATISTICS

1 Bliss, C. I.
Fitting the negative binomial distribution to biological data (with a note on the efficient fitting of the negative binomial by R. A. Fisher).
Biometrics 1953 : **9** : 176–200.

The maximum likelihood estimation is described in the note and illustrated by a numerical example in the paper. In the paper it is compared with other estimates; the error variance and tests for agreement are also illustrated. Models underlying the negative binomial are reviewed with reference to observed distributions of both plants and animals. A comparison with other distributions favours the negative binomial. Finally the maximum likelihood estimation is extended to the calculation of a single index from a series of similar distributions, and the testing of their homogeneity by χ^2.

2 Henderson, C. R.
Estimation of variance and covariance components.
Biometrics 1953 : **9** : 226–52.

Three methods are described for estimating variance components in a nonorthogonal case of a "mixed" model, i.e. with both constants and components of variance appearing. They are illustrated by some data on butterfat records from cows in a breeding programme. The extension to covariance is indicated.

3 Box, G. E. P. & Hay, W. A.
A statistical design for the efficient removal of trends occurring in a comparative experiment with an application in biological assay.
Biometrics 1953 : **9** : 304–19.

It is required to compare the response rates at various doses of two preparations when there is a time trend in the rates. An experiment is described in which blocks of size two are used; each block contains the two preparations used at the same dose. For maximum accuracy the doses in each block are arranged so that the effects of dose and time are orthogonal. It is shown how this can be done, with k blocks or doses, assuming a p^{th} degree polynomial for the time trend and a q^{th} degree for the response rate. An illustration is given and the calculations described where $p = 3$, $q = 2$, $k = 8$.

4 Plackett, R. L.
The truncated poisson distribution.
Biometrics 1953 : **9** : 485–88.

A method of estimating the Poisson parameter when the zero class is missing is provided.

5 Williams, E. J.
Tests of significance for concurrent regression lines.
Biometrika 1953 : **40** : 297–305.

This paper gives solutions of the problem of testing regression lines for concurrence and of finding fiducial limits for the point of concurrence, as well as discussing further applications of the fitting of concurrent lines. Some restrictions on the independent variable are assumed; it is sufficient for this to be identical for each set. The analysis is compared with the previous work of Tocher.

6 Box, G. E. P.
Non-normality and tests on variances.
Biometrika 1953 : **40** : 318–35.

The fact that the usual tests for the homogeneity of a set of variances, in particular Bartlett's test, are very sensitive to non-normality is demonstrated. It is explained why this is so and what can be done to avoid the difficulty. This result is in marked contrast to that concerning tests of means (analysis of variance) which are very insensitive to departures from normality. One important practical consequence which emerges from these results is that a test of homogeneity of variance should not be applied before making an analysis of variance test for homogeneity of means, in which test homogeneity of variance is assumed. A test which is insensitive to departures from the conditions assumed but not tested is said to be robust. It is argued that robustness may be more important than maximum power.

7 Cox, D. R.
Some simple approximate tests for poisson varieties.
Biometrika 1953 : **40** : 354–60.

Consider the observation of events occurring

* General studies, see also individual crops.

randomly at a rate λ. The suggestion is made that if we observe n events in a fixed time, t, we may work approximately as if n is fixed and $2\lambda t$ is distributed as χ^2 with $2n + 1$ degrees of freedom. Reasons for making the suggestion are given, and it is applied to construct simple significance tests and confidence intervals for the ratio of two rates. The accuracy of the method is considered. A logarithmic transformation permits extension to the case where the rate is the product of unknown parameters.

8 Birnbaum, A.
Some procedures for comparing poisson processes or populations.
Biometrika 1953 : **40** : 447–49.

The design and analysis of experiments for investigating the relationship between two Poisson parameters is considered.

9 Durbin, J.
A note on regression when there is extraneous information about one of the coefficients.
J. Amer. statist. Ass. 1953 : **48** : 799–808.

Suppose n triplets of observations are available to fit a linear regression of one dependent variable on two independent variables, and, in addition, an unbiased estimate, together with its standard error, of one of the regression coefficients is available. Which is the best method of estimating the other coefficient? Two methods are suggested and illustrated by an example.

10 Rider, P. R.
Truncated poisson distributions.
J. Amer. statist. Ass. 1953 : **48** : 826–30.

This paper gives a method of estimating the parameter of a Poisson distribution which has been truncated at its lower end.

11 Rauterberg, E.
Die Berechnung der Streuung von Versuchsergebnissen. (**The estimation of the deviation of experimental results**).
Z. PflErnähr. Düng. 1954 : **64** : 244–58.

An estimation of σ can be obtained by splitting the results of a series of experiments into two components, β and μ, β having the same value within a single series of experiments but differing between series, while μ has approximately the same value over the whole series and can be equated with σ. This approach is contrasted with that provided by analysis of variance.

12 Arruda, H. V. de
Análise de uma experiência fatorial 4^2, em blocos de 4 canteiros, apresentando parcial fusão de interação. (**Analysis of a 4^2 factorial experiment with blocks of 4 plots with partial confounding**).
Agros, Rio Grande do Sul 1953 : **6** : 72–86.

An analysis is given of a 4^2 factorial experiment involving 2 factors, each at 4 levels, with 3 replications and 4 plots per block. The interaction of the two factors was partially confounded with the interblock variance.

13 Youden, W. J. & Connor, W. S.
The chain block design.
Biometrics 1953 : **9** : 127–40.

The designs are likely to be of value in experiments with small errors. Treatments are either repliçated once or twice only. The method of analysis is described and illustrated by an example.

14 Nair, K. R.
Design and analysis of triangular singly linked blocks.
Biometrics 1953 : **9** : 141–56.

The design is a partially balanced incomplete block design with p blocks, two replicates, p–1 treatments per block and $p(p-1)/2$ varieties. An example is included.

15 Jacob, W. C.
Split-plot half-plaid squares for irrigation experiments.
Biometrics 1953 : **9** : 157–75.

A description of the above design in an experiment with fertilizer and potato varieties is presented. The reasons for use of the design and its detailed analysis are given.

16 Kempthorne, O. & Tischer, R. G.
An example of the use of fractional replication.
Biometrics 1953 : **9** : 295–303.

The purpose of this paper is to illustrate the use of the principles of fractional replication in a complex situation. The example refers to the dehydration of sweet corn.

17 Rayner, A. A.
Quality × quantity interaction.
Biometrics 1953 : **9** : 387–411.

A method proposed by Fisher for estimating the effects of quality and the interaction of quality and quantity in experiments containing a number of qualities of a fertilizer at a number

of quantitative levels is discussed, and the interpretation of these estimates from the experimental point of view is considered.

18 MURTY, V. N.
Analysis of a triple rectangular lattice design.
Biometrics 1953 : **9** : 422–24.
An alternative analysis of data given by Cochran and Cox is presented (cf. *PBA**, Vol. XXI, p. 220).

19 GOMES, F. P.
The use of Mitscherlich's regression law in the analysis of experiments with fertilizers.
Biometrics 1953 : **9** : 498–516.
The law relates the mean yield y to the amount x of fertilizer by the equation

$$y = A\,[1 - 10^{-c(x+b)}],$$

A, c and b are constants. The estimation of the parameters by least squares and by iterative methods is discussed; tables are provided for 4 and 5 levels. The accuracy of estimation is discussed, the economic aspect considered and an example included.

20 ANDERSON, R. L.
Recent advances in finding best operating conditions.
J. Amer. statist. Ass. 1953 : **48** : 789–98.
Suppose the response from an experiment depends on a number of factors. This paper contains a survey of the experimental procedures which have been suggested in order to estimate the levels of the factors which give the optimal response, and to explore the dependence of the response on the factors in the neighbourhood of the optimum. It is supposed that the experiment can be sequentialized, the factor levels can be varied continuously, and the experimental error is small and well-estimated in advance.

21 ATANASIU, N.
Über den Ausgleich bei Feldversuchen. (**On compensation in field experiments**).
Z. Acker- u. PflBau 1954 : **98** : 255–64.
The author discusses (1) to what extent soil heterogeneity in field lay-outs can be analysed in terms of a population of plots, each with its characteristic yielding potentiality, the whole assemblage conforming to a Gaussian distribution; and (2) how such a knowledge of the distribution of yielding potentiality can be used to provide a more accurate estimate of crop yields.

22 MITSCHERLICH, E. A.
Über die Anlage von Feldversuchen und die Verarbeitung ihrer Ergebnisse. (**On the lay-out of field trials and the working out of the results**).
Z. Pflanzenz. 1954 : **33** : 17–22.
A general discussion of the ways in which errors due to soil heterogeneity can be dealt with by the use of appropriate lay-outs is discussed in the light of the principles enunciated by the author in his earlier papers (cf. *PBA*, Vol. VI, Abst. 416 and Vol. XXI, p. 455).

23 MUDRA, A.
Zur Bestimmung der Einzelfehler in Sortenversuchen. (**The determination of the individual errors in variety trials**).
Z. Pflanzenz. 1954 : **33** : 23–30.
The difference method is recommended for estimating the homogeneity of the individual errors in field trials in order to ascertain whether the average error can be used for the t-test. Examples are worked out for the randomized block and Latin-square lay-outs.

†GENETICS

24 PLATONOV, G. V.
(**V. I. Lenin and progress in biological science**).
Ž. obšč. Biol. (J. gen. Biol.) Moscow 1954 : **15** : 3–17. [Russian].
Some of the most significant achievements of Soviet biology are attributed to the influence which dialectical materialism has had upon scientific thought. Mičurinite genetics and Lysenko's recent hypotheses on inheritance and vigour (cf. *PBA*, Vol. XXIII, Abst. 847) are held to conform with the principles enunciated by Lenin and other Marxist classical writers (cf. *PBA*, Vol. XVIII, Abst. 2000).

25 STREŠINSKIĬ, M. O.
(**Inheritance and variability**).
Vestn. Akad. Nauk SSSR (Rec. Acad. Sci. USSR) 1954 : No. 7 : 87–92. [Russian].
An abridged account of a meeting held at the USSR Institute of Genetics in January 1954 is presented. A report by Gluščenko formed the basis of the discussion, which centred around phasic development, directed changes in plants and ways of improving breeding methods. The

* *Plant Breeding Abstracts.*
† General studies, see also individual crops.

speakers included Lysenko, who outlined his theories on evolution and discussed Mičurinite methods of improving the heredity and vigour of nursery material. Other speakers referred to instances of interspecific conversions in *Triticum*, Baranov expressing the view that all such reports were unconvincing. Reference was also made to new high-yielding, early-maturing varieties of cotton from Uzbekistan and Turkmenia that were obtained by Mičurinite breeding methods. They are said to possess good quality fibre and to be extremely hardy.

26 Nuždin, N. I., Gluščenko, I. E., Kušner, H. F., Pšeničnyĭ, P. D. & Feĭginson, N. I.
(Questions of directing the hereditary constitution and vitality of plant and animal organisms).
Izv. Akad. Nauk SSSR (News Acad. Sci. USSR) 1954 : No. 3 : 3–18. [Russian].

The belief in the inheritance of acquired characters as a basic factor in evolution is reaffirmed and its application to practical agriculture illustrated by the work of Mičurin and Lysenko on such subjects as the conversion of spring into winter cereals, intravarietal crossing, supplementary pollination, and the summer planting of potatoes. The new wheats Odessa 3, 12 and 16 give 2–5 c. per ha. more than the old varieties and are sown on over 6 million ha. New wheats produced by the Institute of Plant Industry have extended the northern limit of wheat cultivation by 1000 km. Lack of knowledge of the precise conditions of development of most characters is regarded as the main reason why the Lysenko theory has failed to produce more results of practical importance. Phasic development is named as the most notable exception, but even here more knowledge is required for certain groups, particularly in respect of the third phase. More knowledge is also required on the precise conditions required to create a new hereditary character, to shatter the heredity of an existing one, or to create new species. The main problems for which further information is required are analysed in turn; they are (1) the production of winter forms of other crop plants in a manner analogous to the conversion of bread wheat into *Triticum durum* by autumn sowing; the production of more hardy forms of winter crops by the same means; and a study of the number of generations required to effect these changes; (2) the problems connected with increasing vigour through the agency of the fertilization process, e.g. by intravarietal crossing, mixed pollination and selective fertilization, and intervarietal crossing in seed production; a further study of the fertilization process, the significance of multiple fertilization, the origin of sex cells from non-cellular material, the influence of conditions of fertilization on the transmission of hereditary characters and the vigour of the offspring; and the use of interspecific crossing; (3) and (4) similar problems applied to livestock.

27 Brumbaugh, R. S.
Plato's genetic theory.
J. Hered. 1954 : **45** : 191–96.

Reasons are advanced for supposing that Plato's eugenic recommendations were based on a genetic theory which postulated that (1) characters could be represented on a linear scale, the "golden mean" or norm$^{(0)}$ representing the most desirable expression of the character, while each degree of excess$^{(+1)}$ or deficit$^{(-1)}$ is progressively more undesirable, and (2) inheritance is additive according to this linear scale. It would follow from this theory that crosses between superior parents would produce superior offspring ($0 + 0 = 0$), crosses between superior and inferior types, inferior offspring ($0 + 1 = 1, 0 + (-1) = -1$), while crosses between inferior types might produce either superior or inferior types ($1 + (-1) = 0, 1 + 1 = 2$).

28 Kempthorne, O. & Tandon, O. B.
The estimation of heritability by regression of offspring on parent.
Biometrics 1953 : **9** : 90–100.

The authors consider the estimation of heritability from data on parent and offspring, when the regression is assumed linear. The analysis takes account of the correlation between offspring from the same parent. The special case where the offspring are only half-sibs is considered in more detail, and an example on the production of milk from cows is included.

29 Haskell, G.
Correlated responses to polygenic selection in animals and plants.
Amer. Nat. 1954 : **89** : 5–20.

Mather's theory of correlated responses to selection for polygenic characters is explained and reported examples of correlated heredity in plant and animal selection are discussed in the light of this theory. The phenomenon of correlated responses has so far been observed only in outbreeding species. The transformation of pneumococcal types in bacteria and changes in viruses during their passage through plants are also interpreted in terms of the theory. Evolutionary aspects of correlated heredity are discussed; it is suggested that some species may have become extinct because

specialized selection incurred an associated loss of fertility. The possible significance of correlated heredity in plant breeding is considered, with particular reference to the author's experiments on pleiocotyly as a means of releasing useful concomitant variations. Specialized polygenic selection involving correlated responses should not be carried too far in one direction, otherwise the general balance of the species will be disturbed.

30 Porsch, O.
(Sex-linked scent of flowers).
Öst. bot. Z. 1954 : **101** : 359–72.

The protandrous flowers of *Polygonum bistorta* give off an unpleasant smell when the stamens mature, but are scentless when the ovaries mature. The effect of the scent, which may be assumed to be from the pollen, upon insect visitation of the flowers is considered. It seems possible that a thorough investigation of the chemistry and distribution of pollen scent might yield valuable results from the standpoint of evolution.

31 Fisher, F. J. F.
Use of an iris diaphragm for simplifying emasculation technique in *Ranunculus*.
New Phytol. 1954 : **53** : p. 541.

A technique whereby *Ranunculus* flowers can be emasculated in 1–2 min. by means of an iris diaphragm placed over the flower is described.

32 Nakamura, N.
(The estimation of combining ability).
Ikushugaku Zasshi/Jap. J. Breeding 1953 : **3** : No. 2 : 23–28. [Japanese].

Formulae are derived for estimating (1) general combining ability from the yield data of a series of single crosses, (2) the yield of a missing cross by minimizing the specific combining ability, and (3) the relation between combining ability and the genes responsible for heterotic effects in each of the parents.

33 Sakai, K. & Suzuki, Y.
(Random drift of allelic genes during seed selection in allogamous plants and loss of hybrid vigour).
Ikushugaku Zasshi/Jap. J. Breeding 1953 : **3** : No. 2 : 55–58. [Japanese].

The chances of losing one member of a heterotic allelomorphic pair after 0–10 generations in which 0–100 parents only are used for propagation are calculated, and corresponding data are given on the concurrent loss in heterosis that would be expected.

34 Rollins, R. C.
Cytogenetical approaches to the study of genera.
Plant Genera, their Nature and Definition. Chron. bot. 1953 : **14** : 133–39.

Ways in which cytogenetical studies may assist in generic discrimination are discussed. The principal cytogenetical criteria for congeneric status are ability to hybridize, and, in some cases, identity of chromosome number or similarity in chromosome structure.

35 Fisher, R. A.
A fuller theory of "junctions" in inbreeding.
Heredity 1954 : **8** : 187–97.

The theory of junctions introduced by the author in his *Theory of Inbreeding* (cf. *PBA*, Vol. XIX, Abst. 173) and extended by O. H. Bennett (cf. *PBA*, Vol. XXIV, Abst. 777) is here presented in a more complete form, and now takes into consideration digenic internal junctions. The frequency of fixation and of loss of junctions is calculated for the first 10 generations of inbreeding, also the expected frequencies of external and internal junctions. The expected number and length of end and enclosed heterogeneous tracts are calculated for the 5th–40th generations and the probability of complete homogeneity for the 25th–65th generations.

36 Breider, H.
El gen en su complejo y en el plasma. **(The gene as a complex and in the plasma).**
Bol. Inst. Invest. agron., Madr. 1954 : **14** : 179–90.

Cases are cited in which the effects of a dominant gene can be suppressed by other genes, by external agencies such as X rays or by foreign plasma. Various sexual anomalies in vegetatively propagated vines are described in illustration of the inactivation of gene complexes forming part of the total complex determining sex. Many of the intermediate degrees of expression are exceedingly susceptible of modification by environmental factors.

37 Kimura, M.
Process leading to quasi-fixation of genes in natural populations due to random fluctuation of selection intensities.
Genetics 1954 : **39** : 280–95.

A mathematical analysis of changes in the frequency of a pair of alleles where there is no dominance and where the genes are selectively neutral on the average is presented, assuming that random fluctuations in selection intensity

occur. Complete fixation or loss of either allele does not occur under these circumstances in the case of large populations; instead, a state of near fixation or loss, termed by the author quasifixation or quasiloss, respectively, is liable to result. These findings are contrasted with the complete fixation or loss of alleles that is expected as a result of genetic drift in small populations. An asymptotic solution for the process of genetic drift is given.

38 Nei, M.
Mathematical studies on the breeding behavior of partially allogamous plants.
Ikushugaku Zasshi/Jap. J. Breeding 1953 : **3** : No. 2 : 1–5.

Expressions are derived for the frequency of gametes to be expected after n generations of partially allogamous fertilization, assuming an initial single factor difference or a population with a single multiple allelomorphic series. Formulae are also given for the expected frequencies in such a population of homozygotes of r independent gene pairs.
A method of calculating the proportion of crossing from the zygotic frequencies is given.
A short discussion of the consequences of differential seed production, as between the individual genotypes of bulk-propagated breeding material, is appended.

39 Ehrenberg, L. & Andersson, G.
Probable side-effect of nuclear reactions in the biological action of fast protons.
Nature, Lond. 1954 : **173** : p. 1086.

In experiments on dry dormant seeds of the barley Bonus, the relative frequency of "rare" chlorophyll mutants (other than *albina, viridis* and *xantha* types) induced by fast protons resembles that obtained by treatment with densely ionizing radiations. It is suggested that this unexpectedly high efficiency in mutational effect is attributable to secondary ionization caused by short-range particles, mostly α particles and low-energy protons, formed in inelastic collisions of the high-energy protons with the nuclei of the seeds.

40 Scarascia, G. T.
Effetti citologici di estratti acquosi di semi di *N. tabacum.* (**Cytological effects of aqueous extracts of seeds of *N. tabacum*).**
Tabacco, Roma 1954 : **58** : 220–26.

Treatment of root meristems of *Allium cepa* with aqueous extracts of seeds of different ages, obtained from the variety Dark Virginia, resulted in chromosome contraction, arrested metaphases and absence of mitosis. The results were unaffected by differences in the age of the seeds or in the dilution of the extracts. In the author's view, such extracts were unable to induce chromosome breakage.
On transferring the roots into water, growth was resumed, accompanied by the formation of small subapical tumours and by the resumption of mitotic cycles.
Comparing his results with those of Gisquet *et al.* (cf. *PBA*, Vol. XXII, Abst. 1314), the writer suggests that any mutagenic agent present may be a liposoluble substance which, in aqueous (in contrast to pressure) extracts, is in such low concentration that its threshold of action is not attained.

EVOLUTION

41 Sukačev, V. N. [Editor].
(**A survey of articles and letters received by the editor of "Botaničeskiĭ Žurnal" in connexion with the discussion on problems of species and evolution**).
Bot. Ž. (Bot. J.), Moskva 1954 : **39** : 76–89. [Russian].

Hitherto unpublished contributions relating to the discussion on evolutionary problems conducted by the *Botaničeskiĭ Žurnal* since 1952 are presented in précis form. The majority of the contributors disagree with Lysenko's theories on interspecific and intraspecific relations and reject his thesis of new species suddenly arising from existing ones. Among those contributors supporting Lysenko are Sadovskiĭ, who advocates radical changes in systematics to conform with the practical requirements of Mičurinite agrobiology, and Makarov-Kožuhov, who describes Sukačev's evidence of interplant competition in vetches as unconvincing. Other supporters of Lysenko criticize Turbin and Ivanov for their unreformed Darwinian concepts (cf. *PBA*, Vol. XXIII, Absts. 1634 and 1635), while Nosenko stresses the right of a scientist to revise his theories, thereby indicating that Turbin and Ivanov were unjustified in drawing too many conclusions from discrepancies between Lysenko's earlier and more recent writings.

42 Ivanov, N. D.
(**The question of development of new forms in nature and under culture**).
Bot. Ž. (Bot. J.), Moskva 1954 : **39** : 90–100. [Russian].

Darwin's basic laws on the evolution of new forms of life are said to be still valid. As, however, Mičurin has demonstrated that the breeder

can hasten the development of new forms of cultivated plants and domestic animals by replacing natural selection by his own skill, it is advocated that breeding programmes should include both hybridization and experiments with directed training. Lysenko's concept of evolution is compared with the attempts of Weismann-Morganists, Neo-Darwinists and others to revise Darwin's theories.

43 Efeĭkin, A. K.
(Dissemination of distorted ideas on Darwinism in secondary schools).
Bot. Ž. (Bot. J.), Moskva 1954 : **39** : 122–25. [Russian].

The teaching of Lysenko's version of evolution and especially the incorporation of his views in a text book for the upper forms in schools in the RSFSR are deprecated.

44 Sukačev, V. N. [Editor].
(Some results of the discussion on problems of species and evolution and the further aims of the discussion).
Bot. Ž. (Bot. J.), Moskva 1954 : **39** : 202–23. [Russian].

A detailed analysis of the principal contributions to the discussion, most of them published in the *Botaničeskiĭ Žurnal*, is given. The conclusion arrived at is that Lysenko's concept of species and evolution is based on theoretical and methodological errors and has no practical value. It is proposed that the discussion on evolutionary problems, other than the above issue, which is regarded as settled, should be continued. A long list of recent Russian papers relevant to the controversy is appended.

45 Šiškin, B. K.
(The question of the evolution of new forms).
Bot. Ž. (Bot. J.), Moskva 1954 : **39** : 224–27. [Russian].

The concept of evolution by interspecific conversion is rejected in favour of principles founded on adaptation and hybridization. Mention is made of a new natural hybrid, designated *Sorbocotoneaster*, found in wooded districts of Jakutia. It combines the morphological characters of *Sorbus sibirica* with those of *Cotoneaster melanocarpa*.

46 Kamyšev, N. S.
(Problems of species and evolution from a botanico-geographical viewpoint).
Bot. Ž. (Bot. J.), Moskva 1954 : **39** : 228–35. [Russian].

Lysenko's ideas on interspecific relations and on the conversion of one species into another and his definition of the term species, which is said to ignore morphological, physiological, ecological, geographical and historical factors, are rejected.

47 Hohlov, S. S.
("Some new ideas in the science of biological species" and practical agriculture).
Bot. Ž. (Bot. J.), Moskva 1954 : **39** : 357–79. [Russian].

Lysenko's concept of the evolution of species by conversion is described as a metaphysical theory which hampers scientific progress in agriculture, and regret is expressed that it should have received official support. So-called conversions of hard wheats into soft wheats are attributed either to the hard wheat variety having a soft wheat as ancestor and giving segregates, or to competition, in fields where both hard and soft wheats are present, leading to the replacement of the hard wheat.

48 Vasiljev, V. N.
(Species seen as a geographical phenomenon).
Bot. Ž. (Bot. J.), Moskva 1954 : **39** : 380–93. [Russian].

Botanical data on geographical variability, conflicting with Lysenko's thesis that a species may, without producing intermediate forms, evolve suddenly into another, are presented. In this connexion Tolmačev (cf. *PBA*, Vol. XXIV, Abst. 790) is also criticized. The explanation of the origin of intermediate geographical forms by interspecific hybridization is rejected.

49 Wald, G.
The origin of life.
Sci. Amer. 1954 : **191** : 45–53.

A development of Oparin's theory of the origin of life is presented. The problem regarded as most difficult to envisage is the coupling of a system of organic molecules with an energy source sufficient to counteract its dissolution. It is emphasized that complex organic molecules tend to orientate themselves in solution even *in vitro*.

50 Paszewski, A.
Poglądy Linneusza na powstawanie gatunków. **(The views of Linnaeus on the origin of species).**
Acta Soc. Bot. Polon. 1954 : **23** : 195–215.

The author shows by an historical survey of many of the dissertations and writings of Linnaeus and also of some of his pupils, that Linnaeus gradually abandoned the theory of

the simultaneous creation of species and came to the conclusion that species could arise in the course of time. Moreover, excerpts from his later works show that he came to hold the view that species arose through hybridization. He never accepted the theory that the external conditions might contribute to the production of new systematic units.

51 Mason, H. L.
Migration and evolution in plants.
Madroño 1954 : **12** : 161–69.

Migration is divided into three categories: seasonal migration, the oscillating movement in response to seasonal climatic changes, characteristic of migratory birds; sporadic migration, exemplified by the occasional suicidal migrations of the arctic lemming; and secular migration, where the movement persists over many generations, often in a specific direction. The latter is of principal evolutionary importance and the author discusses to what extent secular migration depends on genetical variability in physiological characteristics.

52 Burma, B. H.
Reality, existence, and classification: a discussion of the species problem.
Madroño 1954 : **12** : 193–209.

In this general discussion as to the significance of the term species, the author develops the notion of populations as networks of space-time world lines. He concludes that the term species is too closely associated with the Platonic archetype and Aristotelian form to be of any further use in exact discussions of the nature of biological diversity; as an alternative, he suggests that a better basis for discussion is provided by phyletic-line segments.

*CYTOLOGY

53 Ellengorn, Ja. E. & Rjabinina, M. I.
(Some characteristics of ontogenetically young and of differentiated cells).
Izv. Akad. Nauk SSSR (News Acad. Sci. USSR) 1954 : No. 3 : 87–95. [Russian].

Examples are given of the occurrence, growth and division by fission, of enucleate "precells" and other enucleate matter which is described as forming at the point of development of various adventitious organs in a number of different plant species. The later formation of nuclei in some of these enucleate tissues is also described. The precells have an isoelectric point round pH = 4·5, like the cells in the undifferentiated embryo of *Allium odorum*, from which it is concluded that they are devoid of deoxyribonucleic acid and are incapable of mitosis. In fully differentiated cells the isoelectric point is at about pH = 3.

54 Pivovarova, R. M.
(Origin of nuclei *de novo* within cells of the stem of *Caragana arborescens* Lam.).
Izv. Akad. Nauk SSSR (News Acad. Sci. USSR) 1954 : No. 3 : 96–102. [Russian].

In the dermatogen giving rise to the epidermal and subepidermal cells of *C. arborescens*, cells were observed in which new nucleoli arose, apparently *de novo* and not by budding from the existing nucleolus, both within the nucleus and also in the cytoplasm; in both cases they gave rise to new nuclei, which at first differed from the original nucleus of the cell by a less acid isoelectric point; they later developed ribonucleic acid and assumed the normal isoelectric point. This amitotic reproduction can take place side by side with normal mitoses, sometimes in the same cell. The amitotic processes became more intense as development proceeded and later spread to other tissues.

55 Taylor, J. H. & McMaster, R. D.
Autoradiographic and microphotometric studies of desoxyribose nucleic acid during microgametogenesis in *Lilium longiflorum*.
Chromosoma 1954 : **6** : 489–521.

Autoradiographic analysis indicated that incorporation of P^{32} in deoxyribose nucleic acid (DNA) occurred at three relatively short interphase periods: (1) at preleptotene before meiotic prophase in microsporocytes, (2) at late interphase preceding mitosis in the microspore and (3) during early to mid-interphase in the generative nucleus of the pollen grain. During the period of DNA synthesis, incorporation of P^{32} into ribonucleic acid (RNA) was low or absent but in the interval between cessation of DNA synthesis and prophase the incorporation of P^{32} in RNA of both nucleus and cytoplasm reached its peak. Microphotometric determination of the amounts of DNA, as indicated by the Feulgen technique, revealed that the amount per nucleus remained constant in all stages, except for doubling during the periods of P^{32} incorporation and the reduction by half at each division of the nucleus. The periods of DNA increase, measured photometrically, coincided

* General studies, see also individual crops.

very closely with the periods of incorporation of P^{32} in DNA.

56 McDonald, M. R. & Kaufmann, B. P.
The degradation by ribonuclease of substrates other than ribonucleic acid.
J. Histochem. Cytochem. 1954 : **2** : 387–94.

The observed decrease in Feulgen stainability of onion root-tip sections after treatment with ribonuclease at 60° C has been found to be due to degradation of deoxyribonucleic acid by residual intracellular deoxyribonuclease subsequent to the removal of ribonucleic acid by ribonuclease.

57 Godward, M. B. E.
Irradiation of *Spirogyra* chromosomes.
Heredity 1954 : **8** : p. 293. (Abst.).

Observations on X-ray-induced chromosome fragmentation in *S. crassa* ($n = 12$) have provided support for the hypothesis that the long chromosomes of this organism are compound and polycentric.

58 Bajer, A. & Molè-Bajer, J.
Endosperm, material for study on the physiology of cell division.
Acta Soc. Bot. Polon. 1954 : **23** : 69–98.

Investigations on approximately 30 species have indicated that the endosperm is valuable for the general study of mitosis and chromosome structure *in vivo*. *Asparagus officinalis, Helianthus annuus* and *Pisum sativum* were among the most suitable species. On the whole monocotyledons provided more useful material than dicotyledons. The duration of the different stages of mitosis was correlated with the dimensions of the chromosomes, this correlation being most evident in the case of anaphase.

59 Zimmermann, H.
Untersuchungen zur Tagesperiodizität der Meiosis. (**Investigations on the diurnal periodicity of meiosis**).
Z. Bot. 1954 : **42** : 283–304.

The frequency of the different stages of meiosis in the course of a day was investigated in *Paeonia lutea, Hemerocallis fulva, Antirrhinum majus* and *Oenothera* h*Hookeri·flavens*. In all four species diakinesis showed a rhythmical distribution with a maximum in the forenoon at 10 a.m. and a night maximum, which tended to approach morning, as day length increased. The effects of (*a*) altering the light/dark rhythm and (*b*) constant illumination upon the periodicity of diakinesis were also studied.
In the early stages of meiosis no periodicity could be detected.
Light appears to be a regulating factor in the periodicity of meiosis as well as mitisis (cf. *PBA*, Vol. XXIII, Abst. 60).

60 Wolff, S.
Some aspects of the chemical protection against radiation damage to *Vicia faba* chromosomes.
Genetics 1954 : **39** : 356–64.

Pretreatment of seeds of *Vicia faba* with BAL, or with sodium hydrosulphite, prior to X irradiation, resulted in a decreased frequency of chromosome aberrations, but cysteine, glutathione or sodium ascorbate did not have any protective effect (cf. *PBA*, Vol. XXIV, Abst. 1615). None of the chemicals was able to decrease significantly the frequency of aberrations obtained when the seeds were irradiated in a vacuum. Fractionation of the X-ray dosage did not cause any significant alteration in the frequency of aberrations, compared with continuous dosage; when the seeds were pretreated with BAL, however, fractionation resulted in a decrease in the number of aberrations. It is suggested that chemicals capable of reducing the oxygen tension within the cells increase the restitution rate of the chromosomes broken by X irradiation.

61 Smith, H. H. & Lotfy, T. A.
Comparative effects of certain chemicals on *Tradescantia* chromosomes as observed at pollen tube mitosis.
Amer. J. Bot. 1954 : **41** : 589–93.

Pollen grains of *T. paludosa* were treated with ethylene oxide, ketene and methyl chloride in the gaseous state and, for comparative purposes, also with ultraviolet rays; they were then cultured so that metaphase in the dividing generative nuclei could be studied. The most effective treatments with ethylene oxide and ketene produced 5·21% and 3·52% of aberrations, respectively; the abnormalities scored were erosions, unusually contracted chromosomes and chromatid breaks. Methyl chloride induced a higher percentage of breaks (4·04%) than the other two compounds but no erosions or contractions. Ultraviolet irradiation also caused only chromatid breaks (4·97%). The results are discussed in relation to the general problem of the mode of action of chemical mutagens.

62 Setterfield, G., Schreiber, R. & Woodard, J.
Mitotic frequency determinations and microphotometric Feulgen dye measurements in root tips.
Stain Tech. 1954 : **29** : 113–20.

An account is given of maceration and mounting procedures for determining frequencies of mitotic stages and for making microphotometric measurements of deoxypentosenucleic acid in Feulgen-stained cells. By a combination of HCl hydrolysis prior to staining and pectinase treatment subsequent to staining, free-cell suspensions can be readily obtained. The techniques have been applied to root tips of onion, *Vicia faba* and pea.

63 Sampford, M. R.
The truncated negative binomial distribution.
Heredity 1954 : **8** : p. 292. (Abst.).

The negative binomial distribution is used to describe the proportion of cells in irradiated tissue with 0, 1, 2, . . . chromosome breaks. The author shows how a truncated negative binomial distribution can be used to cover the case in which the chromosomes of some cells present are not susceptible to breakage.

64 Thoday, J. M.
Radiation-induced chromosome breakage, desoxyribose-nucleic acid synthesis and the mitotic cycle in root-meristem cells of *Vicia faba*.
New Phytol. 1954 : **53** : 511–16.

Studies on the frequency of isolocus breaks following irradiation with X rays or α particles showed that the proportion of NUpd breaks was high in material irradiated 48 hr. before fixation and that the proportion decreased slowly as the fixation interval was reduced to 18 hr. and dropped markedly for shorter fixation intervals. This evidence supports the conclusion of A. Howard and S. R. Pelc (cf. *PBA*, Vol. XXIII, p. 660) that DNA synthesis occurs during interphase, 10–20 hr. before metaphase.

65 Resende, F. & Tadeu, M. L.
Somatischer Segmentaustausch zwischen Schwesterchromatiden. (**Somatic segmental interchange between sister chromatids**).
Öst. bot. Z. 1954 : **101** : 353–58.

In support of the senior author's view (cf. *PBA*, Vol. XXII, Abst. 37) that somatic crossing-over may occur between sister chromatids, cytological evidence is advanced regarding the frequency of fracture and reunion in *Aloe mitriformis* var. *commelinii* ($2n = 14$).

Root-tip examinations showed 59 clear cases of single translocation and 8 of deletion in the SAT zone.

The translocation or loss of the segment probably occurs most frequently at the end of prophase, though also, according to some observations (cf. *PBA*, Vol. XXII, Abst. 926), in metaphase and even anaphase. The break occurs in the achromatic portion of the chromatid and the broken surface unites with the terminal portion of the trabant of the sister chromatid. Possible explanations of this fusion of a broken with an unbroken surface are suggested.

66 Schwanitz, F.
Einige Beobachtungen zur Blütenbiologie und zur Sexualität diploider und polyploider Gigaspflanzen. (**Some observations on the floral biology and reproductive mechanism of diploid and polyploid gigas plants**).
Gartenbauwiss. 1954 : **1** : 73–90.

Diploid gigas plants of *Rubus idaeus*, *Lycopersicon* spp. and *Bryophyllum tubiflorum* examined at the Max Planck Institute for Breeding Research, Voldagsen, Germany, bore a greater resemblance to polyploid gigas plants than to diploid nongigas plants.

67 Holodnyĭ, N. G.
(**In defence of plant hormone studies**).
Bot. Ž. (Bot. J.), Moskva 1954 : **39** : 403–14. [Russian].

Research on plant hormones, suspended in the USSR since 1948 as an incidental result of Lysenko's attack on Morganist genetics, is defended. A. A. Avakjan is cited as the principal opponent of plant hormone studies.

68 Haque, A.
Squash method for meiosis in ovules.
Stain Tech. 1954 : **29** : 109–12.

The ordinary Feulgen or acetic-lacmoid squash technique, applied after fixation in Carnoy's fluid, has been found to provide a reliable method of studying meiosis in ovules of a wide range of plants.

69 McGoldrick, P. T., Bohn, G. W. & Whitaker, T. W.
An acetocarmine technique for *Cucurbita*.
Stain Tech. 1954 : **29** : 127–30.

Staminate buds undergoing meiosis are fixed for 12–24 hours in a solution containing 3 parts 95% alcohol, 1 part of iron acetocarmine and a flake of rusted iron. The buds are washed in 95% alcohol, then stored in 95% alcohol with the iron flake for 5–10 days. A stain containing

10 drops of 45% acetic acid, 10 drops of aceto-carmine and 10 drops of the storage solution is prepared. A piece of anther is macerated in the stain on a slide and the debris removed. When the cells turn grey to dark brown a cover slip is applied; the stain is differentiated by gentle heat and the cover slip sealed with paraffin.

*BOTANY

70 Whitehead, F. H.
An example of taxonomic discrimination by biometric methods.
New Phytol. 1954 : **53** : 496–510.

An example illustrating how discriminant analysis of six quantitative floral characters can be used to distinguish between three species of *Cerastium* is presented.

DISEASES, INJURIES, BACTERIA, FUNGI, VIRUSES

71 Clowes, R. C. & Rowley, D.
Genetic investigation of the inhibition by DL-norleucine of the K-12 strain of *Escherichia coli*.
J. gen. Microbiol. 1954 : **11** : 27–33.

No evidence was obtained that the locus *Nl* for inhibition by norleucine in strain K–12 was linked with the loci for threonine, leucine or thiamine synthesis. It was however found to be linked with the loci Gal^+ and $Arab^+$ of mutant W–677 of strain K–12.

72 Dubnoff, J. W.
The growth requirements of variants of *E. coli* mutant 113-3.
Arch. Biochem. 1954 : **52** : 151–56.

A series of variants of mutant 113–3 of *Escherichia coli* characterized by B_{12} requirements ranging from 0·018 to 0·12 mμg./ml. has been isolated. The variants differ in their ability to utilize other compounds as substitutes for their B_{12} and methionine requirements.

73 Heslot, M. H.
Progrès récents dans la génétique des bactéries et des bactériophages. (**Recent progress in the genetics of bacteria and bacteriophages**).
Rev. Quest. sci. 1953 : 50–82.

This survey of recent research on the genetics of bacteria and phages includes sections on mutations, recombinations and reactivation.

74 Imšeneckiĭ, A. A.
(Variability and breeding of micro-organisms).
Priroda (Nature), Leningrad 1954 : No. 5 : 35–44. [Russian].

An account of modern methods of breeding microorganisms, with notes on direct changes obtained in recent years in some bacteria, yeasts and moulds, is given. Induction of mutations by means of toxic substances or irradiation is accepted, with certain qualifications, as a method of producing new forms of micro-organisms.

75 Muromcev, S. N.
(Evolution of species in micro-organisms).
Ž. obšč. Biol. (J. gen. Biol.), Moscow 1954 : **15** : 144–56. [Russian].

Mičurinite laws of inheritance and evolution are regarded as applicable to all forms of life and are related to Lysenko's theories on interspecific conversion. Evidence in support of the thesis that new forms of microorganisms are constantly evolving is presented and the case of *Septoria linicola*, which first appeared in 1931 but has since disappeared, is cited. The following examples of conversion are mentioned: forms of *Bacillus mycoides* indistinguishable from *B. effusus*, *B. olfactorius* and *B. cereus*; and forms of *B. megaterium* resembling *B. tumefaciens*, *B. ruminatus* and *B. pansini*.

76 McGregor, J. F.
Nuclear division and the life cycle in a *Streptomyces* sp.
J. gen. Microbiol. 1954 : **11** : 52–56.

Using the Robinow HCl-Giemsa method of nuclear staining, the life cycle of a *Streptomyces* sp. was found to consist of the following stages: (1) initial nuclear division, (2) primary mycelium, (3) secondary mycelium and (4) spore formation. The method of nuclear division in the ungerminated spores closely resembled mitosis in higher organisms, by the appearance of two terminal bodies whose behaviour was similar to that of centrosomes.

77 Rubin, B. A.
The quantitative estimation of radiation induced mutations to streptomycin resistance in *Escherichia coli*.
Genetics 1954 : **39** : 296–306.

A standardized experimental and statistical method for determining the rate of induced mutation per population is described, with particular reference to investigations on the

* General studies, see also individual crops.

X-ray-induced change from streptomycin sensitivity to resistance.

78 Stocker, B. A. D.
Evidence for a linear order of certain transducible genes in *Salmonella*.
Heredity 1954 : **8** : 292–93. (Abst.).

Genes may be transduced by phage from one *Salmonella* strain to another (cf. *PBA*, XXIV, 1642). Production of flagella depends upon the wild-type form of members of a series of *Fla* genes. In general, a bacterial cell does not simultaneously acquire more than one character by transduction. Certain nonflagellated strains, however, acquire both a Fla^+ gene and a flagellar antigen from the donor strain; such cases are attributed to the occasional simultaneous transfer of an antigen-determining gene (H_1) linked with the transduced Fla^+. Three different H_1-linked *Fla* genes respectively cause absence of flagella in three strains possessing differing latent flagellar antigens. On the assumption that the transducible genes are linearly arranged and that in transduction only one linear component replaces its homologue, the order of the loci concerned can be inferred from the observed interactions of the three strains; experimental support has been obtained for this assumption.

79 Appleyard, R. K.
Segregation of lambda lysogenicity during bacterial recombination in *Escherichia coli* K12.
Genetics 1954 : **39** : 429–39.

Investigations on crosses between lysogenic derivatives of *E. coli* carrying different mutants of the phage λ and between doubly lysogenic and nonlysogenic derivatives are described. The results were consistent with the hypothesis that lysogenicity involved an additional cellular component or prophage attached to the bacterial genetic complex at a specific locus.

80 Appleyard, R. K.
Segregation of new lysogenic types during growth of a doubly lysogenic strain derived from *Escherichia coli* K12.
Genetics 1954 : **39** : 440–52.

Two genotypically different strains of lysogenic *E. coli* defective with respect to the liberation of infective phage were found to carry defective λ prophage. By superinfection of one of these strains with a weakly virulent mutant, a polylysogenic strain carrying a total of six prophage determinants or "alleles" was obtained. During the growth of this polylysogenic strain, bacterial clones segregated in which one or three prophage alleles had been lost, new monolysogenic or polylysogenic types thus arising. It is suggested that recombination of prophage genes is responsible for this phenomenon.

81 Gots, J. S., Koh, W. Y. & Hunt, G. R. (Jun.).
Tryptophan metabolism and its relation to phage resistance in *Escherichia coli*.
J. gen. Microbiol. 1954 : **11** : 7–16.

Phage-susceptible tryptophane-requiring mutants of *E. coli* strain B induced by ultraviolet irradiation fell into five distinct phenotypes with respect to their pattern of alternate requirements of anthranilic acid and indole and also the substances they accumulated in the culture fluids. Tryptophane-requiring auxotrophs resistant to phage T_1 were readily isolated by means of the selective action of this phage upon the susceptible auxotrophs but could not be obtained by selection for the property of tryptophane requirement. Contrary to expectation the tryptophane requiring T_1-resistant form represented a unique tryptophaneless phenotype, characterized by its type of accumulation, growth stimulation by histidine and tyrosine, suppression of accumulation of certain metabolic products by other tryptophane auxotrophs and its epistatic expression of phenotype when superimposed upon different susceptible tryptophane-requiring phenotypes by secondary mutation. A scheme of the mutations possibly involved in the behaviour of the different tryptophaneless phenotypes is suggested.

Symposium on genetics of phytopathogenic fungi.
Phytopathology 1954 : **44** : 337–70.

82 *Keitt, G. W. Introduction to the symposium on genetics of phytopathogenic fungi in relation to basic problems of infectious disease. (p. 337).*

The symposium, held at Madison, Wis., 7 September, 1953, was arranged jointly by the Mycological Society of America and American Phytopathological Society. In his introduction, the speaker emphasized the advances made in microbial genetics in the last 15 years and the importance of research on fungi in relation to basic biological problems.

83 *Snyder, W. C. & Hansen, H. N. Species concept, genetics, and pathogenicity in* Hypomyces solani. *(pp. 338–42).*

Extensive investigations have led the authors to conclude that the many so-called species and varieties of *Hypomyces* (perfect stage) and

Fusarium (conidial stage) are in fact representatives of one large species, *H. solani*. Two kinds of heterothallism occur in *H. solani* f. *cucurbitae*, viz. compatibility heterothallism and sex heterothallism. The former type arises from + and − factors which are allelomorphic, inherited in a 1 : 1 ratio and independent of the factors determining sex. The second type of heterothallism involves loss of sex factors in thalli which were originally sexually perfect. The basic sex factors for the male and female conditions are not allelomorphic but inherited independently. Both kinds of heterothallism may occur simultaneously. The origin of new pathogenic races of fungi through mutation and segregation in saprophytic or pathogenic forms is briefly discussed.

84 *Wheeler, H. E. Genetics and evolution of heterothallism in* Glomerella. (*pp. 342–45*).

Genes at several different loci are involved in sexual reproduction in *Glomerella*, each gene affecting a specific step in this process. Most of the mutant alleles at these loci cause partial or complete blocks but unless both members of a mating carry the same mutant gene the blocks are counteracted. For the sake of convenience the sexual process is divided into four steps: (1) perithecial initiation, (2) plasmogamy, (3) caryogamy and (4) meiosis. In wild-type cultures, (1) is partially blocked as the result of interaction of A^+ and B^+ (cf. *PBA*, Vol. XXII, Abst. 1680); this partial block is repaired if A^2 is substituted for A^+ or if B^1 is substituted for B^+; a third allele, A^1, causes a complete block of (1). Three mutant genes completely blocking (2), arg^1, bi^1 and th^1, also determine requirement for arginine, biotin and thiamin, respectively; two other mutations, F^1 and st^1, cause complete blocks; G^1 is responsible for a partial block. Only one mutant allele, B^2, has been found to affect (3). Meiosis is partially blocked by div^1 (cf. *PBA*, Vol. XXIV, Abst. 873). It is postulated that genes affecting the sexual process do so by controlling the synthesis of specific chemical substances required for completion of the different stages.

85 *Stakman, E. C. Recent studies of wheat stem rust in relation to breeding resistant varieties.* (*pp. 346–51*).

The wheat stem-rust situation was relatively stable in North America from 1938 to 1949 but has since become much more serious and complex. The author discusses (1) the occurrence of numerous biotypes of certain races, notably 15B, (2) the problem of satisfactory differentials for races and biotypes, (3) the effect of temperature conditions upon varietal reaction to races or biotypes, (4) the origin of new forms of the fungus, particularly as the result of sexual recombination, (5) the effect of the varieties grown upon the prevalence of races, (5) stem-rust tolerance due to structural and functional characters and (7) recent progress and current problems in breeding for resistance (cf. *PBA*, Vol. XXIV, Abst. 253).

86 *Holton, C. S. Genetic phenomena in the smut fungi as related to the dynamics of the species.* (*pp. 352–55*).

Literature on the genetics of the smuts of wheat, oats, barley and sorghum is surveyed.

87 *Rowell, J. B. & DeVay, J. E. Genetics of* Ustilago zeae *in relation to basic problems of its pathogenicity.* (*pp. 356–62*).

Recent progress in genetical investigations on *U. zeae* at the Minnesota Agricultural Experiment Station is reviewed. The frequency of mutation for colour is so high that it has been found to be a barrier to the precise analysis of the inheritance of this character. The presence of sporidial mutants may be unsuspected without special methods for their detection (cf. *PBA*, Vol. XXIII, Abst. 961). Mutants more or less virulent than the parent have arisen. Multiple sex groups occur, two *a* factors and 15 different *b* factors having been distinguished. Two amphisexual groups of lines carrying the factors $a^1a^2b^1$ and $a^1a^2b^4$, respectively, were isolated. Pairings between certain lines of *U. zeae* and *Sphacelotheca reiliana* caused gall and chlamydospore formation in inoculated maize; no evidence of hybridization between the lines was obtained; it is suggested that physiological synergism induced gall formation in the absence of a dicaryophase or diplophase and that the gall stimulated the *U. zeae* line to produce chlamydospores. That part of the disease syndrome is independent of dicaryon formation was indicated by the marked increase in pathogenicity shown by some haploid lines when inoculated maize plants received supplementary injections of cell-free culture filtrates from a second compatible line. In further experiments doses of growth regulators did not affect gall formation by *U. zeae*.

88 *Keitt, G. W. & Boone, D. M. Induction and inheritance of mutant characters in* Venturia inaequalis *in relation to its pathogenicity.* (*pp. 362–70*).

Numerous morphological, colour and biochemical mutants have been induced by treatment with nitrogen mustard (β-chlorethyl) amine or ultraviolet rays. Genetical investigations on a large number of the mutants indicated

a monogenic mode of inheritance in the majority of cases. Many mutant genes were located with respect to their distance from the centromere. Three linkage groups were established among the genes for the colour mutants; of the mutant genes for biochemical deficiencies the factor for nicotinic-acid requirement was the only one found to be closely linked with any of the genes determining colour variants. The biochemical mutants fall into groups characterized by deficiencies for vitamins, nitrogen bases, amino-acids or reduced sulphur. In numerous cases genes at different loci affect the requirement for the same metabolite. The effects of biochemical changes upon pathogenicity range from no apparant alteration in some cases to complete suppression in others.

89 Bistis, G. & Olive, L. S.
Ascomycete spore mutants and their use in genetic studies.
Science 1954 : **120** : 105–06.

The mutant characters of ascospore abortion and tan-coloured ascospores in *Ascobolus stercorarius* each depend upon a single gene. Brachymeiosis does not occur in this species. The several advantages offered by this fungus in genetical investigations are indicated.

90 Pontecorvo, G. & Sermonti, G.
Parasexual recombination in *Penicillium chrysogenum*.
J. gen. Microbiol. 1954 : **11** : 94–104.

A preliminary report of investigations on the synthesis of heterozygous diploid strains in which somatic segregation and recombination occur has already been summarized (cf. *PBA*, Vol. XXIV, Abst. 101). Balanced heterocaryons giving rise to heterozygous diploids were successfully isolated by combining dwarf strains or two strains metabolically interlocked in their growth requirements. These two methods of combination favour intracellular rather than intercellular or syntrophic cooperation, a consideration of particular importance in view of the relatively slow rate of growth of *P. chrysogenum* on agar medium.

It is briefly suggested that the parasexual process can be used in deliberate cross-breeding to produce improved industrial strains and in the identification of different genetic blocks in the biosynthesis of penicillin.

91 Pittenger, T. H.
The general incidence of pseudo-wild types in *Neurospora crassa*.
Genetics 1954 : **39** : 326–42.

An abstract reporting the results of these investigations, now described in detail, has been already summarized in *PBA*, Vol. XXIV, Abst. 1667.

92 Markert, C. L.
Lethal and mutagenic effects of ultraviolet radiation on *Glomerella* conidia.
Exp. Cell Res. 1953 : **5** : 427–35.

The survival curves of conidia of *G. cingulata* subjected to ultraviolet irradiation for periods of 30–1500 seconds at 4770 ergs. per sq. cm. per second proved sigmoid, in experiments conducted at the Department of Zoology of the University of Michigan. At high doses of irradiation the survival curve levels off, indicating the presence of a smaller percentage of resistant spores. With increasing period of irradiation the mutation curve reaches a peak and then declines.

93 Catcheside, D. G.
Isolation of nutritional mutants of *Neurospora crassa* by filtration enrichment.
J. gen. Microbiol. 1954 : **11** : 34–36.

Nutritional mutants can be isolated by incubation of irradiated microconidia in a liquid medium deficient in specific growth factors, filtration of the ungerminated conidia and then culture on supplemented media.

94 Fincham, J. R. S.
Genetic control of production of an enzyme in *Neurospora*.
Heredity 1954 : **8** : p. 293. (Abst.).

A mutant with a growth requirement for α-amino nitrogen lacks the enzyme glutamic acid dehydrogenase. In heterocaryons, the mutant nuclei have no depressing effect on the production of this enzyme under the influence of the wild-type allele. The mutation does not appear to have any effect upon the production of other enzymes related to glutamic acid dehydrogenase.

95 Leupold, U. & Hottinguer, H.
Some data on segregation in *Saccharomyces*.
Heredity 1954 : **8** : 243–58.

The following pairs of characters segregated according to a 2 : 2 ratio in most asci : mating types *a* and α, dispersed *vs.* flaky growth, and independence *vs.* dependence with respect to each of four growth factors, histidine, tryptophane, uracil and adenine. For independence of methionine and for the ability to ferment galactose 2 : 2 segregations were somewhat less frequent. Deviating segregations for ability to ferment galactose, pigment formation in adenine-less clones and uracil requirement are interpreted

upon a dihybrid basis. Linkage relations were determined from the data provided by asci segregating according to a 2 : 2 ratio for all characters; close linkage was only detected between the factors for histidine independence (*HIS*) and tryptophane independence (TRY_R). Differences between certain genes studied by the authors and the corresponding genes described by Lindegren are indicated. Two cases of complex segregations were found to be due to tetraploidy.

96 Pomper, S., Daniels, K. M. & McKee, D. W.
Genetic analysis of polyploid yeast.
Genetics 1954 : **39** : 343–55.

Stable polyploid clones of *Saccharomyces cerevisiae*, arising as the result of the rare occurrence of mating between diploids heterozygous for mating type and haploids or other diploids, have been obtained by the prototroph-recovery procedure (cf. *PBA*, Vol. XXIII, Abst. 956). A triploid isolate segregated at meiosis into two diploid and two haploid spores, as shown by (1) analysis of the nutritional requirements and mating type of sporulating cultures derived from the original dissected spores, and, in cases of nonsporulation, by a similar analysis of appropriate crosses, and (2) data on X-ray survival. A tetraploid isolate yielded four diploid spores which gave rise to sporulating cultures. Yeast polyploids are discussed with reference to their possible mechanism of segregation, aberrant ratios in triploids and the occurrence of asci with exceptional numbers of spores in diploid matings.

97 Bartholomew, J. W. & Mittwer, T.
Electron microscope studies of nuclear changes in *Saccharomyces cerevisiae* during bud formation.
Stain Tech. 1954 : **29** : 121–25.

Ultraviolet treatment causes the cytoplasm of yeast cells to clear. In budding cells examined by the electron microscope after irradiation, the nuclei appeared to be in various stages of division, spindle-like figures being discernible. Distinct chromosomes were not observed.

98 Kleyn, J. G.
A study of some environmental factors controlling sporulation of yeast using a new sporulation medium.
Wallerstein Labs Commun. 1954 : **17** : 91–104.

A reproducible medium designated medium "A" and consisting of Difco's Bacto-tryptose, glucose, sodium chloride, sodium acetate and Difco's Bacto-agar was found to be superior to other widely used sporulation media in experiments on *Saccharomyces cerevisiae*. The number of ascospores per ascus is concluded to be mainly determined by environmental conditions rather than by genetic factors.

99 Johnson, T.
Selfing studies with physiologic races of wheat stem rust, *Puccinia graminis* var. *tritici*.
Canad. J. Bot. 1954 : **32** : 506–22.

Selfed cultures of *P. graminis* var. *tritici*, comprising 34 physiological races, were obtained by inoculating barberry with sporidia of the individual races and comparative tests were carried out on the infection types produced by the parent cultures and the corresponding selfed progenies on differential wheat hosts. Of the 42 selfed cultures, only 9 appeared to be homozygous. The data suggested that the infection types produced by a race on the various hosts were independently inherited. In some races, the progenies consisted of substrains. On certain hosts avirulence of the different races was dominant to virulence, on others virulence was dominant. A scheme of inheritance of infection types on a number of differential hosts is postulated, with particular reference to race 49 and its selfed derivatives. It is suggested that the following dominant genes are involved: *R*, for inability to produce infection on Reliance; *M*, for ability to cause large pustules (infection type 4) on Mindum, Arnautka and Spelmar; *E*, for small pustules (type 1) on Einkorn; and *V* and *W*, for small necrotic flecks on Vernal.

100 Hassebrauk, K.
Zur physiologischen Spezialisierung von *Puccinia triticina* Erikss. in der Deutschen Bundesrepublik im Jahre 1952. (**On the physiological specialization of *P. triticina* Erikss. in the German Federal Republic in the year 1952).**
Z. Pflanzenz. 1954 : **33** : 354–56.

The Institute of Physiological Botany, Braunschweig, Germany, reports the occurrence of a new race of *P. triticina* at Münster; in addition, race 4 (= UN4), hitherto unknown in Germany, was identified near Stuttgart. Race 1 (= UN1) was the most prevalent race found in Western Germany; races 11 (= UN10), 17 (= UN11), 18 (=UN12), 43 (= UN14), 53 (= UN1), 93 (= UN11) and 124 (= UN23) were also identified.

101 SIBILIA, C.
Le razze fisiologiche di *Puccinia graminis tritici* Erikss. et Henn. in Italia ed in Europa. (**The physiological races of *P. graminis tritici* Erikss. et Henn. in Italy and Europe**).
Boll. Staz. Pat. veg. Roma 1953 (1954) : **11** : 159–64.

This survey of the distribution and incidence of races of *P. graminis* var. *tritici* in various countries of Europe is based on records cited in the accompanying bibliography of 18 references.

102 BASILE, R.
Razze fisiologiche di *Puccinia triticina* Erikss. e di *Puccinia graminis tritici* Erikss. et Henn., su grani duri e teneri provenienti dall'Algeria. (**Physiological races of *P. triticina* Erikss. and of *P. graminis tritici* Erikss. et Henn. on hard and soft wheats from Algeria**).
Boll. Staz. Pat. veg. Roma 1953 (1954) : **11** : 165–68.

The writer records the discovery of race 11 of *P. triticina* and a race, that is possibly new, of *P. graminis* var. *tritici* upon wheats from Algeria. The latter she designates Alg. 1.

103 SEQUEIRA, L.
Nuclear phenomena in the basidia and basidiospores of *Omphalia flavida*.
Mycologia 1954 : **46** : 470–83.

Applying the aceto-orcein squash technique, the following cytological behaviour was observed. Typically, the fusion nucleus derived from the two nuclei of the basidium underwent three divisions, two of which were meiotic; all three divisions occurred transversely to the long axis of the basidium. At diakinesis the chromosome number was found to be $n = 6$. Typically, the third division occurred in the basidium and subsequently four nuclei migrated into the spores. In one atypical cycle designated A, double nuclear migration occurred after the three divisions of the fusion nucleus; in atypical cycle B, the third division was delayed, being accomplished in the spores. Intermediate types of cycles were also observed. *O. flavida* may be either homothallic or heterothallic as the result of its variability in nuclear behaviour.

104 ASCHAN, K.
Some facts concerning the incompatibility groups, the dicaryotization and the fruit body production in *Collybia velutipes*.
Svensk. bot. Tidskr. 1954 : **48** : 603–25.

Mating in the above species was shown to be tetrapolar. Clamps, however, were found in the contact zone only when the *B* factors but not the *A* factors were identical.

105 RIPPEL, K.
Ist das Virusmolekül ein Gen-Komplex? (**Is the virus molecule a gene complex ?**)
Landw. Jb. Bayern 1954 : **31** : 348–55.

The chemical composition of the gene, its role in determining heredity and the way in which mutations occur are discussed. It is postulated that virus molecules may be gene fragments which have at some time broken away from the main gene complex of the living cell and developed independently.

106 STREISINGER, G.
Inheritance and phenotypic expression of type difference characters in bacteriophage.
Diss. Abstr. 1954 : **14** : Publ. No. 7877 : 910–11. (Abst.).

Differences in ultraviolet sensitivity, host range and genotype, distinguishing phages T2 and T4, depend upon specific genes, which have been located in the linkage map of T2L.

107 MACKAL, R. P. & KOZLOFF, L. M.
Biochemical studies of virus reproduction. XII. The fate of bacteriophage T7.
J. biol. Chem. 1954 : **209** : 83–90.

Experiments in which isotopically labelled bacteriophage T7 was used to infect host cells under a variety of conditions provided evidence that, as in the case of T6, transfer of parental material to progeny phage was not correlated with transmission of heritable properties (cf. *PBA*, Vol. XXII, Abst. 1666 and Vol. XXIII, Abst. 2345).

108 DICKINSON, L.
The behaviour of a temperate phage of *Pseudomonas aeruginosa* compared with that of a serologically related, virulent mutant.
J. gen. Microbiol. 1954 : **11** : 105–13.

A temperate phage of the above bacterium, when added to a nonlysogenic indicator strain, produced a typical lysogenic culture. A virulent mutant, serologically related to the temperate phage, was obtained from this lysogenic culture. The multiplication of both the virulent and temperate phages was inhibited by a phenanthridine added immediately after adsorption; the initial stage of infection was therefore similar in the two types. The production of free phage by the lysogenic culture derived from

the temperate phage was not inhibited by the drug.

CROP PLANTS

109 **Annual Report (abridged) of the Scottish Plant Breeding Station, Craigs House, Corstorphine, Edinburgh for 1954** : Pp. 70.

In addition to the information summarized below this report contains particulars of the kale, swede and sugar beet breeding programmes in progress.

Oats. Emphasis has been placed on the development of strains adapted to the alkaline soils of the Orkneys and Western Isles. The hybrid 0532 (*Avena byzantina* x Quality) has given promising results under these conditions and selections from it are being multiplied. A few seeds have been obtained from the F_2 of the double hybrid 6*n* (*A. barbata* x *A. strigosa*) x *A. sativa* and from the cross 4*n* *A. strigosa* x *A. abyssinica*.

Forage grasses. Sheep's fescue has been shown to comprise several chromosome races and the geographical distribution of these races is being investigated. Both hexaploid and octoploid forms of red fescue have been collected and a number of crosses between different races made.

Potato. Breeding for eelworm resistance has continued. Line ADG1673, obtained as seed from Cambridge in 1952, has shown considerable promise as a parent in crosses with commercial varieties. Resistance in this material appears to be dominant and the proportion of plants which proved to be free from cysts suggests the segregation of a major gene for resistance.

110 **Thirty-fourth Report and accounts of the National Institute of Agricultural Botany for 1953** : Pp. 47.

The report includes a survey of the main results of variety trials carried out on cereals, potatoes, forage beet and other crops at different centres in Britain.

111 Hauptversammlung des Pflanzenzüchterverbandes e.V. in Heilbronn a.N. (**General meeting of the registered Union of Plant Breeders in Heilbronn on the Neckar**).
Saatgutwirtschaft 1954 : **6** : p. 222.

Vine breeders have now joined the above mentioned body and the papers read at the meeting included one by Husfeld on "Quality breeding in Vines." Legislation in relation to seed production and progress in plant breeding in Germany was discussed by Nicolaisen of the Horticultural Institute, Hanover.

The name of the society has been changed to the "Pflanzenzüchterverband e.V., Bad Godesberg."

112 López Campos, G.
La mejora de plantas en el Max-Planck Institut de Voldagsen. (**Plant improvement at the Max-Planck-Institut at Voldagsen**).
Agricultura, Madrid 1954 : **23** : No. 266 : 320–24.

A description in Spanish of plant breeding work in progress at the above institute is given.

113 Sengbusch, R. von
Züchtung auf Qualität von landwirtschaftlichen und gartenbaulichen Kulturpflanzen. (**Breeding for quality in agricultural and horticultural crop plants**).
Versl. StudKring. PlantVeredel., Wageningen 1954 : 569–81. (Mimeographed).

The evolutionary history of a number of cultivated crop plants is outlined, special emphasis being laid on the importance of individual selection. The author points out that, until the genetical basis of inheritance was established at the beginning of this century, poisonous or unpleasant tasting plants could not be improved by selection as the selector had no means of establishing the existance of edible mutants. Now, however, the presence of favourable mutants may be determined by chemical analysis and it should prove possible to select edible strains from inedible parent stock. The lupin is given as an example of the way in which the process of individual selection has been effected. *Lupinus albus* and *L. mutabilis* have been cultivated since prehistoric times, and have been subjected to an unconscious gradual process of selection. On the other hand, *L. luteus* has become a cultivated edible plant only in this century and as the result of scientific selection. Selection to improve the taste of a number of edible vegetables, such as spinach, chicory, beans, peas and cabbage, and to remove the bitter taste in the husk of oats is advocated.

114 Quadt, F.
Die Züchtung als Faktor der pflanzlichen Produktion. (**Breeding as a factor in crop yield**).
Z. Pflanzenz. 1954 : **33** : 1–16.

A brief review of plant selection from early times to the present day is presented and

successes achieved in the past century with cereals, sugar beet and sweet lupin are indicated. Modern techniques in exploiting heterosis and male sterility and in doubling the chromosome number of certain crop plants are outlined and the possibility of further increasing yields, especially of those forage plants and vegetables that have remained comparatively neglected by the breeder, is discussed.

115 Navolockiĭ, A. V.
(New high-yielding varieties of cereals and legumes for the Leningrad region).
Zemledelie (Agriculture) 1954 : No. 5 : 112–13. [Russian].

Cereals. New varieties produced by the Leningrad Plant Breeding Station include the winter rye Gatčinskaja, which has given an average yield of 37 c. per ha. over the last three years, thus outyielding Vjatka by 6 c. per ha.; it also has larger grain and better standing capacity. Several new winter wheat varieties with improved yielding ability, winter hardiness, standing capacity and quality are mentioned; they include *Triticum* x *Agropyron* hybrid 599, which has large ears and grain, strong straw and has yielded 5 c. per ha. more than Borovičskaja. The spring wheat Tulun 70 is superior to the older varieties such as Lutescens 62 in quality and suitability for combine harvesting; it is exceeded in yield by a still newer variety, Leningrad, which is also distinguished by high milling and baking quality.

Legumes. The pea Masličnyĭ [Oily] has outyielded Capital by a wide margin; Snežinka [Snow Flake] is four days earlier in ripening and exceeds Masličnyĭ in yield by 3–4 c. per ha. The new field pea Spartanec [Spartan] gives very high yields of grain and straw, exceeding those of the best vetches by 10–12 c. per ha., and ripens a month earlier under the conditions of the Leningrad province. A vetch which ripens somewhat earlier than previously existing varieties has also been produced and has been named Leningrad 671.

116 Tsitsin [Cicin], N. V.
The 1954 U.S.S.R. agricultural exhibition.
Soviet News 1954 : No. 2977 : 3–4.

The director of the exhibition describes its chief features. Among the exhibits are some 2000 crop varieties, of which 354 represent the cereals, including high-yielding wheat-*Agropyron* hybrids highly resistant to lodging and plots of perennial wheat. A large "Mičurin orchard" is also on display.

117 Vestergaard, E.
Abed Planteavlsstation. **(Abed Plant Breeding Station).**
Planteavl. Loll.-Falster 1953 (1954) : 3–12.

The current report (cf. *PBA*, Vol. XXIV, Abst. 2749) from this station includes the following information:—

Wheat. Further particulars regarding the yields of Danish, Swedish and French wheats in government trials (cf. *PBA*, Vol. XXIII, Abst. 2601) will be reported later in detail together with results of other work.

As part of the breeding programme in 1952–53, yields of ten numbered varieties were compared with Skandia IIIB as control; the varieties retained for further testing included four Abed hybrids of Eroica x Joncquois, the hybrid Abed 8–53 from the cross Abed 32 x Jubilé [Jubilee], and Abed 9–15, a selection from Joncquois.

The value of Norwegian mildew-resistant spring wheats in crosses is being investigated.

New crosses of Nord Desprez [Desprez North] and of Cappelle Desprez have been made.

Oats. One promising selection, Abed 636, from a cross of Minor x Abed 30, is of normal height but very stiff-strawed; its grain closely resembles that of Minor, with a very high husk percentage. Minor and Palu are undergoing further selection.

Results of the oat trials, continued during 1949–52 at the government experimental stations, have already been recorded (cf. *PBA*, Vol. XXIV, Abst. 2865).

Barley. Facilities for the raising of malting barley hybrids in winter under artificial lighting have now been made available.

Continued variety trials during 1949–52 have been described elsewhere (cf. *PBA*, Vol. XXIII, Abst. 2688).

In barley breeding at Abed, selection is now based mainly on resistance to diseases, e.g. loose smut, rust or mildew, the object being to obtain varieties that equal the current varieties in yield in normal years and exceed them in seasons when disease is prevalent.

The two varieties Abed 738 (Archer x Kenia) and 89 (Abed 317 x Isaria) continue to show high yields approximating to that of Herta, but Abed 738 has much stiffer straw (cf. *PBA*, Vol. XXIII, Abst. 2688).

The mildew-resistant Abed 975 and 978, both derived from Balder x Weihenstephan II, did not give as good yields of grain as last year.

Two newer barleys, Abed 1–24 and 1–34, are stiff, long-strawed selections from the short-strawed Rigel line 7–95; the second gave an

exceptionally high yield of grain. Another new selection from Balder x Weihenstephan II is an erect mildew-resistant barley with extremely stiff straw; it has already been used in hybridization and F_2 populations are being raised in the greenhouse.

118 Holme Hansen, H. H.
Lokale Forsøg og andre Planteavlsarbejder. (**Local trials and other work of plant cultivation**).
Planteavl. Loll.-Falster 1953 (1954) : 13–128.

This 1953 review (cf. *PBA*, Vol. XXIV, Abst. 2785) includes detailed reports showing the results of manurial experiments and variety and strain trials of barley, wheat, rye, oats, clover and root crops.

119 Eliasson, S.
Swedish varieties and strains, their characteristics and cultivation districts.
K. LantbrHögsk. o. Stat. LantbrFörs., Stat. JordbrFörs., Stockholm & Uppsala 1954 : No. 81 : 15–38.

Comprehensive data on the parentage, yield, maturity, quality, resistance to diseases and insect pests, area of cultivation and source of seed are given for the principal varieties of cereals, forage grasses, leguminous crops, fibre plants, root crops and oil plants developed and cultivated in Sweden. A map of Sweden in which the various zones of cultivation of the main crops are delineated is also provided.

120 de Haan, H.
The showroom at the Institute of Agricultural Plant Breeding 1954.
Euphytica, Wageningen 1954 : **3** : 161–66.

An account is given of the exhibits and demonstrations arranged for visitors in a showroom at the Institute of Agricultural Plant Breeding, Wageningen, to illustrate investigations on crop breeding in the Netherlands.

De 19e Nederlandse Landbouwweek. (**The 19th Netherlands Agricultural Week**).
Landbouwk. Tijdschr., 's-Grav. 1954 : **66** : 505–78.

This report of the nineteenth Netherlands Agricultural Week, held in Wageningen on the 5–9 July 1954, includes the following articles of interest to plant breeders:—

121 *Toxopeus, H. J. De huidige stand van het kweken op resistentie tegen aardappelmoeheid.* (*The present state of breeding for resistance to potato sickness*). (*p. 537*).

The results of crosses and back crosses between races of *Solanum andigenum* resistant to sickness and cultivated Netherlands varieties are given. Resistance appears to depend upon a single dominant gene; some of the back-cross hybrids possess satisfactory commercial qualities. The resistant *S. andigenum* tubers were obtained in 1951 from the Commonwealth Potato Collection, Cambridge.

122 *Ferwerda, F. P. Monoploiden als uitgangspunt voor homozygote diploide lijnen bij mais.* (*Monoploids as starting point for homozygous diploid lines in maize*). (*pp. 528–30*).

An account of Chase's work in the USA on the production of homozygous diploids from monoploids (cf. *PBA*, Vol. XXII, Abst. 2669) is given and the practical value of this process in the development of hybrids indicated. Monoploids were isolated with the aid of marker genes at Wageningen in 1953 with a view to using élite synthetics in recurrent selection and to producing lines to replace inbreds in the development of hybrids.

123 *Harmsen, G. W. & Wieringa, K. T. Pogingen tot verbetering van de entstof voor leguminosen.* (*Attempts to improve inoculates of leguminous plants*). (*pp. 531–33*).

Work at the Microbiological Laboratory of the Groningen Agricultural Research Station in comparing the nitrogen-fixing efficiency of different strains of *Rhizobium* of various provenance is described. One selected strain, designated K8, has proved to be highly efficient in fixing nitrogen, to compete well with other strains and to multiply freely in all types of soil and on almost all types of clover.

124 *Wit, F. De perspectieven van chromosomenverdubbeling voor de veredeling van raaigrassen en rode klaver.* (*The prospects of chromosome doubling in breeding ryegrass species and red clover*). (*pp. 533–36*).

Strains of tetraploid red clover obtained by colchicine treatment at the Institute of Plant Breeding, Wageningen, proved superior in vegetative growth and gave higher yields of forage than the original diploid varieties. Tetraploid forms of *Lolium perenne* proved generally inferior in vigour to the $2n$ initial material, although some $4n$ lines equalling the best $2n$ strains were obtained. Experiments with *L. multiflorum* proved more encouraging, some $4n$ lines producing higher yields of both forage and seed than $2n$ forms and displaying in addition greater resistance to cold and rust.

125 *de Willigen, A. H. A. Hoger fosforgehalte en hogere viscositeit van aardappelmeel door rassenkeuze.* (*Higher phosphorus content and higher viscosity in potato flour by varietal selection*). (*pp. 544–45*).

A high positive correlation between phosphorus content and viscosity, the two factors determining the quality of potato flour, was established in experiments conducted at Wageningen. A close interaction between variety and phosphorus content of the soil was also found, Voran having the highest viscosity and phosphorus content of the varieties tested. It is suggested that crosses between *Solanum demissum* and *S. tuberosum* should be investigated to discover whether varieties with a higher viscosity and phosphorus content than Voran may be developed.

126 *Fischnich, O. Exertion of influence on the sprouting of potatoes, and the practical value of such procedure for breeder and grower.* (*pp. 566–78*).

The influence of temperature, ventilation, treatment with growth-inhibiting chemicals and exposure to artificial light on the germination of stored seed-potatoes is discussed and differences in optimum storage temperatures of some German varieties are noted. The identification of varieties by a study of the morphology of their shoots after treatment with a growth-promoting substance and the use of growth-promoting substances to induce germination in immature tubers with a view to obtaining several generations in one season for breeding purposes are also discussed.

127 Larose, E.
L'amélioration des plantes de grande culture et leur exploitation en Belgique. (**The improvement of crop plants and their exploitation in Belgium**).
26me. Congr. Féd. nat. Un. profess. agric. Belge 1951 : Pp. 35.

This monograph presents an historical account of plant breeding in Belgium since the beginning of the present century, together with a brief description of the principal plant breeding research stations, and gives technical information on the organization of variety trials and on seed production in Belgium.

128 **Annual Report of the Indian Council of Agricultural Research for 1951-52** (1954) : Pp. 181.

Wheat. Of 22 varieties of wheat tested in Bombay for resistance to races of stem rust prevalent in India, only E845 and KGPF 4508, 1521, 4652 and 4676 proved satisfactory; no variety possessed adequate resistance to race 15. Strain 88, from the Indian Agricultural Research Institute, was highly resistant to all commonly occurring races of stem rust and almost completely free from field infection. F_3 selections from Mondhya 3–2 x E144 proved highly resistant to most races of rust and were also satisfactory from the agronomic point of view. In Madhya Pradesh, the Australian variety E220 was found to be highly resistant to rust and E839 moderately resistant. A number of selected strains of W245 also proved resistant.

Maize. In trials of US hybrids at 17 centres in southern India, Dixie 11 and 18 and US13 gave the highest yields. In Uttar Pradesh, the local variety Farrukhabad significantly outyielded the foreign hybrids with which it was compared.

Rice. Several Chinese varieties have been grown and multiplied in Kashmir, West Bengal and the Punjab and have generally proved superior to the local varieties. China 1039 gave exceptionally high yields, matured early and was resistant to disease. Selection of lines of Chinese rice adapted to local conditions is in progress. Co. 25 and Co. 26, two new high-yielding strains selected and released by the Madras Experiment Station, have proved highly resistant to *Piricularia oryzeae* and *Fusarium moniliforme* var. *majua*.

Sorghum. An account of the extensive inbreeding and hybridization programme being conducted at the Millet Breeding Station, Coimbatore, is given. The new variety PT833 gave yields 17% higher than those of the control; the performance of hybrids X1 and X2 was also encouraging.

Cowpea. In tests of varietal differences in susceptibility to mosaic in Bombay province, Alacrowder, Early Sugar Crowder, Suwannee and Taylor proved resistant and Early Red highly tolerant.

129 **Annual Report of the Department of Agriculture, Assam 1951-52** (1954) : Part I : Pp. 103.

The results of variety trials of rice, potato, cotton, jute, orange and pea conducted at various localities and on different types of soil are presented. In trials of sugar cane, Co. 419 and Co. 462 gave the highest yields of sugar per acre and also possessed the highest sucrose contents. Varieties of sugar cane recently introduced into the state include 45 new Co. canes.

130 **Annual Report on the Department of Agriculture, Gold Coast, for the period 1st April, 1952 to 31st March, 1953** (1954) : Pp. 28.

Millet. The selection and breeding programme continued. Many selfed lines showed loss of vigour but in a few cases lines possessing exceptional uniformity and vigour were obtained.

Sorghum. Susceptibility to insect damage was found to be high among dwarf sorghums of the Plainsman type and low among the hard-grained shallu varieties. Crosses were made to combine the hard grain of the shallu varieties with the superior straw and grain qualities of the Plainsman type.

Rice. In varietal comparisons at Esiama, Guiana 79 gave the highest yields.

Groundnuts. Variety trials were continued. Some of the new Nigerian strains proved promising.

131 **Annual Report of the Director of Research and Specialist Services, Southern Rhodesia for the year ended 30th September, 1953** (1954) : Pp. 54.

Wheat. Of varieties under trial at the Sabi Valley Experiment Station, Pusa 4 and Kenya Governor have given the best results.

Maize. The double hybrid N3 x A5 x T4 x M9 gave exceptionally high yields in varietal comparisons at the Sabi Valley Experiment Station.

Sorghum. Of 36 varieties tested at the Matapos Research Station, Dwarf White Milo and Argentine 5152 and 5140 gave the highest yields. The Argentine varieties also showed considerable resistance to damage by birds. Selection work on 43 tall, 19 dual purpose, 72 dwarf and 36 double dwarf varieties was carried out at the Matapos Research Station. The new hybrids Angeni and Sambura gave satisfactory results and selections from them will be back-crossed to the parent varieties next season. At the Sabi Valley Experiment Station, Caprock, Early Hegari and Dwarf Managil gave the highest yields of the grain varieties tested. At the Nyamandhlovu substation, Rustenburg and Early Hegari proved the most promising varieties.

Clover. Of 5 strains tested at the Melsetter Station, S100 gave the best results.

Potato. In trials at the Salisbury Experiment Station, Up-to-Date produced the highest yields.

Sunflower. Of 8 varieties under trial at the Matapos Research Station, Mars gave the best results on both clay and sand soils.

Apple. A spontaneous mutant of the variety Versfeld maturing six weeks earlier than the parent strain has been discovered at the Salisbury Experiment Station.

Beans. In trials of velvet beans at the Salisbury Experiment Station, Strain 52 proved highly resistant to rust.

132 Compte Rendu 1953. (**Annual Report, 1953**).
Rech. agron. Madagascar 1953 : Pp. 144.

In addition to the crops listed below, accounts of breeding work on vanilla and of new varieties of sugar cane introduced into the island are given.

Wheat. Pusa x Mentana 934, Pusa x Mentana 9290 and Pusa x Mentana 10359 significantly outyielded other varieties in trials at the Alaotra Agronomic Station. Kenya 310 and 318 proved disappointing under tropical conditions but may provide useful breeding material.

Rice. In variety trials conducted at five centres throughout the island, Makalioka 34 gave the best all-round results. It is described as a hardy variety with vigorous growth, resistant to lodging and suitable for mechanical harvesting. Makalioka 823 also gave high yields at most centres. A new variety, Vary Lava 47M, is described. A natural hybrid between Vary Lava 28M and Vary Lava 16A, it is more resistant to shedding than either of its parents.

Groundnuts. The hybridization and line-selection programme of the Alaotra Agronomic Station is described and new introductions, mainly from Spain and Morocco, are listed. Of varieties cultivated for oil extraction, Buitenzorg 214, Valencia 247 and hybrids 32 and 33 gave the highest yields in recent trials. Of varieties grown for export as edible nuts, Rustembourg produced the largest kernels.

133 **10th Annual Report of the Inter-American Institute of Agricultural Sciences for the year 1952** (1953) : Pp. 160.

This report includes information on breeding projects and variety trials carried out by the Institute at Turrialba, Costa Rica.

Maize. Some inbred lines of the variety I–451 have proved highly resistant to lodging. In trials of varieties from a number of Central and South American states and from the USA, I–451 and I–452 gave the highest yields.

Rice. Of 49 varieties studied for seedling reaction to *Helminthosporium oryzae,* Berlin, Dourado Peludo x Fortuna, Dourado Agulha and Kriviman Kotti showed considerable resistance to heavy artificial infection.

Potato. In trials of late-blight resistant varieties conducted near Cartago, three introduced varieties, Harford, Cortland and Kennebec, averaged 373 bushels per acre and the seedling DUA–2 437 bushels per acre.

Progress was made in determining the adaptation, disease resistance and yielding ability of some 300 new seedlings and varieties introduced from the USA; 39 seedlings were notable for their resistance to late blight and for their high yields.

Of eleven varieties introduced from the Netherlands, Alpha, Voran, Gloria and Ackersegen gave the highest yields; all these varieties showed a high incidence of late blight.

Coffee. Several varieties of *Coffea arabica* have been introduced from Guatemala, Ethiopia and Brazil.

Beans. The new black-seeded dry bean Rico has proved superior in yield to other dry bean varieties and is also highly resistant to *Pellicularia* blight. Crosses of this variety with the snap-bean varieties Tendergreen, Low's Champion and Red Valentine have been effected with the intention of selecting forms with tender, stringless pods from the F_2.

134 Quisenberry, K. S.
El mejoramiento de las plantas de cultivo. (**Breeding crop plants**).
IV Conf. Interamer. Agric. II Reun. Reg. Latinoamer. Agric. Aliment. 1951 : 502–08.

An outline is given of the plant breeding work of the US Department of Agriculture, emphasizing the importance of plant introduction and collecting expeditions; among the achievements mentioned is the production of hybrid corns adapted to almost every state, smooth-awned, disease-resistant barleys, rust-resistant varieties of wheat and other cereals and of flax, cottons suitable for mechanized harvesting, red clover resistant to anthracnose, lucernes resistant to bacterial wilt, many useful soya bean varieties, sugar beets and canes with multiple disease resistance, tobacco resistant to Granville wilt and other diseases, hybrid onions, and improved varieties of many other vegetables and fruits.

Proceedings of the Soil Science Society of Florida. Volume XIII. 1953 (1954) : Pp. 204.

Symposium: breeding crop plants for better adaptability to Florida conditions. (*pp. 32–28*).

135 *McCloud, D. E. Forage and cover plant introduction by the Florida Agricultural Experiment Station.* (*pp. 32–38*).

An account is given of the work of the Florida Agricultural Experiment Station since 1887 in introducing and testing new species and varieties of forage and cover crops obtained from abroad. Among economic crops made available in this way to Florida farmers are high-yielding varieties of forage grass, velvet beans, cowpeas, lupin and clover.

136 *Chapman, W. H. A coordinated small grain breeding program for Florida and southeastern United States.* (*pp. 39–42*).

The importance to Florida of developing cereal varieties with a high degree of disease resistance is discussed and a brief survey of recent rust epidemics in the state given. The location and breeding objectives of the principal research stations are then described and the present pattern of interstate cooperation is outlined. The benefits that would accrue as the results of closer coordination between different states in their breeding programmes are emphasized; for example, it should be possible to obtain two generations of spring and intermediate types in one year by means of a winter sowing in the south followed by a summer sowing in the north of the USA.

137 *Earhart, R. W. The importance of disease resistance in small grain improvements.* (*pp. 43–47*).

The roles of the breeder and pathologist in developing new cereal varieties resistant to disease are outlined, with special reference to the importance to Florida of obtaining oat varieties resistant to rust.

138 *Carver, W. A. Peanut breeding and variety response to environment.* (*pp. 48–51*).

A discussion of work on groundnut breeding at Florida research stations is given and varietal differences in response to a wide range of fertilizers noted. During the period 1928–52, 173 intervarietal crosses were made; the most productive varieties resulting from these crosses have been Dixie Runner, Early Runner and Florispan Runner.

139 *Horner, E. S. The field corn breeding program in Florida.* (*pp. 52–56*).

The work of Florida experiment stations in developing varieties of hybrid maize adapted to local environments is discussed. Experiments on variety x environment interactions have shown that mineral content of the soil, amount of moisture present and temperature have a

considerable influence on the choice of the variety to be grown. For example, in trials carried out in 1953 it was found that Dixie 18 consistently outyielded Funk's G–737 on the mineral soils of North Florida but was markedly inferior to Funk's G–737 on the organic soils of South Florida. Recurrent selection (cf. *PBA*, Vol. XXI, Abst. 295) has been found to give excellent results and progress made by this method in breeding new high-yielding hybrids is discussed.

140 *Walter, J. M. Soils problems confronting the tomato breeding program.* (*pp. 57–59*).
The importance of breeding varieties adapted to the environment in which they are to be grown is stressed and instances cited of strains giving high yields under certain conditions but failing completely when cultivated in a different environment.

141 *Bregger, T. A brief summary of sugar cane breeding in Florida—1930–1953.* (*pp. 60–63*).
An account of the history and work of the Everglades Experiment Station is presented, together with data on new varieties developed there in the past two decades.

142 *Lorz, A. P. The development of new varieties of table legumes for production in Florida.* (*pp. 64–70*).
A brief summary of work being carried out at Florida experiment stations in the breeding of new strains of snap beans, Lima beans and peas is given, together with brief descriptions of promising varieties recently developed.

143 *Crall, J. M. History and present status of watermelon improvement by breeding.* (*pp. 71–74*).
The work of the Watermelon and Grape Investigations Laboratory of the Florida Experiment Station is described. Considerable progress has been achieved in the development of breeding lines resistant to anthracnose and *Fusarium* wilt, the new varieties Congo (cf. *PBA*, Vol. XX, Abst. 1213) and Fairfax (cf. *PBA*, Vol. XXIII, Absts. 1544 and 3055) resulting from this programme. Other problems to which attention is at present being paid are the development of new strains resistant to downy mildew, stem blight and the root-knot nematode.

144 *Decker, P., Webb, T. E. & Edwardson, J. R. Varietal improvement of lupines for Florida.* (*pp. 75–78*).
Breeding for resistance to diseases and insect pests in Florida is surveyed. Alta Blue (cf. *PBA*, Vol. XXI, Abst. 2752 and Vol. XXIII, Abst. 2023) and Florida 2, adapted for cultivation on heavy and sandy soils respectively, are the most suitable varieties for this region and possess a fair degree of tolerance to insects and diseases.

145 *Eddins, A. H. & McCubbin, E. N. Improvements in potato varieties and yields at Hastings, Florida.* (*pp. 79–82*).
An account of the activities of the Potato Investigations Laboratory, Hastings, from 1938 to 1953 in developing and testing new high-quality varieties resistant to late blight, common scab and bacterial wilt is presented. Trials over the past sixteen years have shown Red Pontiac and Cherokee to give the highest yields; these varieties are, however, inferior in quality to Sebago, which is the most widely cultivated variety in the Hastings region. Yield per acre at Hastings has increased 122% since 1938 as the result of planting new high-yielding, disease-resistant varieties.

146 *Wallace, A. T. & Clark, F. A. Breeding flue-cured tobacco for root-knot resistance and desirable leaf type.* (*pp. 83–87*).
Problems involved in breeding new varieties combining good quality of leaf with resistance to *Meloidogyne* sp. are discussed. Crosses carried out in Florida in 1951 between a narrow-leaved, Colombian strain of *Nicotiana tabacum* and commercial varieties indicated that genes for narrow leaf and resistance to nematodes were closely linked, but that no pleiotropism was involved. It is expected that by using the method of recurrent selection devised by Hull (cf. *PBA*, Vol. XV, Abst. 996) it will be possible eventually to combine high quality of leaf with resistance to nematodes.

147 *Kincaid, R. R. Improvement of cigar-wrapper tobacco by breeding.* (*p. 88*).
This short account of breeding objectives underlines the importance of developing a new strain combining the leaf quality of the variety Rg with resistance to wilt and nematodes. Dixie Shade, released in 1953, possesses a degree of resistance to blackshank equal to that of Rg and is also less susceptible to some leaf diseases and to nematodes than Rg.

148 **62nd and 63rd Annual Reports of the Alabama Agricultural Experiment Station, January 1, 1951 — December 31, 1952** (1954) : Pp. 62.
Forage and soil legumes. A new strain of woolly-pod vetch has given a particularly good performance as a green-manure crop.
Genotype has a marked influence upon tannin content in *Lespedeza sericea*. A highly significant

correlation was obtained between tannin content of the leaves and that of the stems; leaf analysis should prove satisfactory in separating plants with high and low contents of tannin.

Cotton. The medium-early, disease-resistant and high-yielding variety Auburn 56 was released. It has a staple length of 1–1 $\frac{1}{16}$ in. and ginning outturn of 35–37%. Strains with suitability for mechanical picking and high tensile strength have been selected from hybrids 81 and 9531.

Lettuce. Winter-hardy types showing a wide range of plant characteristics have been developed from crosses between Imperial 847 and an unnamed hardy local strain.

Cowpea. Five high-quality table varieties have been bred and released: Alabunch, Alabrowneye, Alacrowder, Alalong and Early Dixie Queen. Alabunch and Early Dixie Queen produce green peas 45–55 and 45–50 days after planting, respectively. Alalong is a mid-season to late variety, taking 70–90 days. Alabrowneye and Alacrowder give pickings in 60–75 and 50–60 days, respectively.

149 **Research in Agriculture. Annual Report, 1951-52, 1952-53, of the Louisiana Agricultural Experiment Station** : 1953 : Pp. 240 : 1954 : 244.

In addition to the data on the crops listed below, the results of variety trials and breeding work on sweet corn, oats, rice, lucerne, forage grasses, clover, peach, strawberry, tomato, cucumber, water melon, cauliflower, beans and peas are presented.

Maize. Recommendations based on trials conducted at seven centres from 1951 to 1953 are made as to the varieties most suitable for cultivation in Louisiana. In the northern parts of the state, the white hybrids Dixie 11, Louisiana 468 and Coker 811 and the yellow hybrids Dixie 18 and 22, NC27 and Funk's G–714A give the best results. In southern Louisiana the white hybrid Louisiana 521 and the yellow hybrids Dixie 18 and Funk's G737 are recommended.

Potato. LaSoda and Red LaSoda, a mutant of LaSoda, outyielded all other varieties with which they were compared in trials at a number of centres in Louisiana and South Dakota.

Sweet potato. Earlyport produced the highest average yields at all centres.

Cotton. The results of trials of commercial varieties and new strains conducted at six centres in 1952 and 1953 are reported. The leading commercial varieties at Baton Rouge were Fox, Plains, Louisiana 33, Stoneville 5A–3202 and Coker 100WR; at St. Joseph the leading varieties were Louisiana 33 x 14, Delfos 9169, Stoneville 5A–3202, DES7343, Bobshaw, Coker 100WR50–39 and Empire P–493. A number of new Louisiana DS strains developed from crosses between Deltapine 14 and Stoneville 2B considerably outyielded the control Deltapine 15 at St. Joseph, Bossier City and LeCompte. In tests for disease resistance at Natchitoches and Baton Rouge, Auburn 56, Clevewilt 6 and Sikes 38–6 proved resistant to both *Fusarium* wilt and root nematodes.

Onion. In trials at Diamond, Baton Rouge and Chase, the varieties Granex, Texas Early Grano 502 and San Joaquin produced the heaviest yields. The primary objectives of the breeding programme remain the improvement of Creole by selection for higher yields, deep red colour, higher dry matter content and resistance to bolting, splitting and diseases. Hybrids between Calred and Creole have displayed a high degree of resistance to mildew.

Cabbage. In variety tests conducted at Breaux Bridge, Louisiana, in 1953, Copenhagen Market and Detroit Resistant gave the highest yields. Allyear produced the best quality cabbage and Medium Copenhagen proved highly resistant to yellows.

150 Fisher, C. D.
Variety performance trials of . . . cotton, corn, barley, oats, wheat, red clover, alfalfa and soybeans. Data for 1953 with summaries of results from previous years.
Bull. Tenn. agric. Exp. Sta. 1954 : No. 237 : Pp. 16.

Information on variety trials conducted in 1953 by the University of Tennessee Agricultural Experiment Station are presented, together with yield averages for previous years. A list of varieties recommended for cultivation in the state is appended.

Wheat. Seneca and Thorne produced the best yields.

Winter oats. Five commercial varieties and three experimental strains were tested, Victorgrain 48–93 and Fulgrain giving the highest yields.

Maize. Data on grain quality and number of ears per 100 plants are tabulated for 34 commercial and experimental hybrids tested at six centres. The experimental hybrid TO142 produced the best yields, closely followed by Dixie 33.

Barley. The new variety Watauga gave higher yields and had a stiffer straw and a more erect

head than Jackson 1, which in past years has proved superior to all other varieties cultivated in Tennessee.

Lucerne. Williamsburg and Du Puits gave the best results during 1953 but further trials are considered necessary before these varieties can be properly evaluated.

Red clover. Kenland proved superior to the five other varieties with which it was compared at three centres.

Cotton. Data on yield, number of bolls per pound weight, date of first picking and lint percentage, strength and length are presented for twelve commercial varieties and six experimental strains tested at four centres in the state. The experimental strain T89 gave the best yields at all stations. Of the commercial varieties, Cobal produced the highest yields in Knox County and Lawrence County, Fox in Madison County and Empire Wilt in Tipton County.

Soya beans. The early varieties S100 and Dorman, the midseason variety Ogden and the late variety Volstate are recommended for cultivation in the state.

151 **Annual Report of the University of Wisconsin Agricultural Experiment Station Part I and II.**
What's New in Farm Science. 1954 : Bull. Nos. 510 and 511 : Pp. 80, 68.

Oats. Varietal differences in susceptibility to rust in Wisconsin during 1952–53 are noted. Branch oats (cf. *PBA*, Vol. XXI, Abst. 308) and Sauk (cf. *PBA*, Vol. XXIII, Abst. 1904) proved highly resistant to both stem and leaf rusts. Sauk appears to be best adapted to the southern regions of Wisconsin.

Rye. The new variety Adams (cf. *PBA*, Vol. XXIV, Abst. 1915) is reported to give slightly higher yields, to be more disease resistant and to possess a more uniform colour than Imperial, from which it was derived.

Maize. Three new hybrids are described. The red-grained hybrid W335A is adapted to northern and central Wisconsin and matures in 90 days. It has longer and more slender ears than W335 and husks more easily. W435 is a high-yielding, red-grained hybrid similar to W335 and matures in 100 days. W642, which matures in 117 days, is similar to W641AA and gives high yields of good quality grain. In field appearance and quality of straw it is superior to W641AA.

Barley. The occurrence of a new physiological race of *Helminthosporium sativum* capable of attacking the hitherto resistant variety Kindred is reported from Wisconsin, Minnesota and North and South Dakota.

Clover. Tests in 1952–53 showed Wisconsin Mildew Resistant to be highly resistant to powdery mildew, Dollard and Purdue to be resistant to black stem and to those physiological races of anthracnose occurring in North Wisconsin, and Kenland to be resistant to southern races of anthracnose.

Forest trees. Introduced hybrid clones of poplars are being screened for resistance to stem canker and other diseases. Controlled hybridization among superior local poplars is being effected; under greenhouse conditions proper flower development is promoted by temperatures of 59–68° F, 40–60% relative humidity and continuous light. Seed stored for 18 months at 34° F or below and at relative humidities below 25% has shown 85–90% germination. Pine breeding is also in progress.

Onion. The new hybrids Aristocrat (cf. *PBA*, Vol. XXIV, Abst. 3412), Epoch, Bonanza, Abundance, Encore, Champion, Elite and Early Harvest gave good results in trials. The first three varieties in the above list are described as possessing outstanding keeping quality; commercial seed is expected to be available in 1955 or 1956.

Cucumber. Wisconsin SR12, a new scab-resistant, pickling variety, is described briefly. As SR12 is somewhat inferior in quality to certain other varieties grown in the state, it is recommended for cultivation only in areas where scab and mosaic present serious problems.

152 Geiszler, G. N.
Results of nine years of crop experiments on the North Central Agricultural Experiment Station.
Bull. N. Dak. agric. Exp. Sta. 1954 : No. 389 : Pp. 59.

A summary of the results of variety trials of wheat, oats, rye, hybrid maize, barley, millet, flax, potato, apple, plum, cherry, grapes, strawberry, raspberry and gooseberry carried out in North Dakota from 1945 to 1954 is presented together with data on the degree of disease resistance possessed by different varieties of cereals.

153 Heinisch, O.
Die Entwicklung der Pflanzenzüchtung in Beziehung zur Bevölkerungszunahme. (**The development of plant breeding in relation to the increase in population**).
Wiss. Ann. 1954 : **3** : 342–58.

Detailed data on increases in the yields of crop plants in Germany over the last hundred years

as the result of breeding and selection work are presented and it is concluded that yield increases that may be expected in the foreseeable future should be more than sufficient to meet the demands, in Germany, of an increasing population.

154 Rietsema, J.
Physiologische isolatie bij planten. (**Physiological isolation in plants**).
Vakbl. Biol. 1954 : **34** : 106–15.
The literature on physiological barriers to interspecific and intraspecific crosses is surveyed and further investigations to discover ways in which these barriers may be obviated in plants of economic importance are urged.

155 Torssell, R. (Editor).
Mutation research in plants.
Acta agric. Scand. 1954 : **4** : 359–642.
In his preface to this comprehensive survey of Swedish research on the induction of mutations by physical and chemical agents, R. Torssell, the editor, pays tribute to the pioneer work of H. Nilsson-Ehle, to whose memory this special issue is dedicated.

156 *Gustafsson, Å. Swedish mutation work in plants: background and present organization.* (*pp. 361–64*).
A short historical survey of investigations on radiation-induced mutations in barley and other crops is presented, together with a list of the institutes and personnel concerned.

157 *Ehrenberg, L. Ionizing radiations: mechanism of action and dosimetry.* (*pp. 365–95*).
Knowledge of the mechanism of the biological action of ionizing radiations is reviewed from the chemical and physical aspects. Sources and instruments available for the production of different types of ionizing particles in biological experiments are described. In surveying methods of measuring doses, the author lays special stress on actinometry, i.e. chemical dosimetry.

158 *Ehrenberg, L. & Nybom, N. Ion density and biological effectiveness of radiations.* (*pp. 396–418*).
Experiments on barley seeds have shown that neutrons are more effective than X rays in inducing hereditary changes. The various effects of neutron treatment, unlike those of X irradiation, are not influenced by chemical protection or by variation in the physiological condition of the cells, except in the case of presoaking of the seeds. It is postulated that densely ionizing radiations, such as neutrons, act more directly on the hereditary material than X rays and other sparsely ionizing radiations. The latter type are believed to have a damaging action on the cytoplasm, in addition to their more indirect genetical effects. Neutrons and X rays also differ in the distribution of the different types of mutants induced, e.g. *erectoides* mutants occur more frequently after neutron treatment.

159 *Mac Key, J. The biological action of mustards on dormant seeds of barley and wheat.* (*pp. 419–29*).
Experiments on the effects of treating dormant seeds of barley and wheat with nitrogen mustard or mustard gas are reported. Mustard compounds are evidently less active than X rays in their influence upon cells at the resting stage and their effects are less immediate. The toxicity of the mustards tends to obliterate their mutagenicity. Compared with X rays, fast neutrons and P^{32}, the mustards induce a relatively higher frequency of *viridis* mutants but lower frequency of *albina* types.

160 *Nybom, N. Mutation types in barley.* (*pp. 430–56*).
Morphological, physiological and cytological mutants induced by X rays and other radiations at the Mutation Laboratory of the Swedish Seed Association, Svalöf, are classified and described. Most of the mutations are recessive to the original allele; no completely dominant mutations have been detected.

161 *Holm, G. Chlorophyll mutations in barley.* (*pp. 457–71*).
Some investigations on induced chlorophyll-deficient mutants at the Institute of Lund are reported, information being given on the spectrophotometric method found satisfactory in pigment analysis, the pigment and plastid patterns of the different mutants, the effect of environmental factors upon the expression of chlorophyll mutations, the condition of the plastids in some common types, and genetical aspects. Cases of monofactorial heterosis are probably the result of the production of a higher content of pigment in the heterozygotes. Allelic relationships of the various chlorophyll mutations are under investigation.

162 *Hagberg, A. Cytogenetic analysis of erectoides mutations in barley.* (*pp. 472–90*).
Results obtained from research on induced mutants of the *erectoides* (*ert*) type at Svalöf are discussed in a preliminary survey. Sixteen loci have so far been found for mutations affecting ear density. The *ert* mutations have a widely pleiotropic effect. Investigations have been carried out on homozygotes for *ert* genes from

two different loci (cf. *PBA*, Vol. XIX, Abst. 673) and on heterozygotes involving one or more *ert* genes (cf. *PBA*, Vol. XXIII, Abst. 2624). The competitive ability of *ert* mutants is being studied. Some mutations, such as *ert* d^{14}, cytologically analysed in detail in this paper, are inherited independently of concomitant translocations. In order to locate the different *ert* mutations, use is being made of Burnham's series of X-ray-induced mutants of Mars, homozygous for translocations involving all the chromosome pairs; "secondary mutants," such as trisomics and chlorophyll aberrants, are also being investigated.

163 *Wettstein, D. von. The pleiotropic effects of erectoides factors and their bearing on the property of straw-stiffness.* (*pp. 491–506*).

Analysis of the total length of the straw, lengths of internodes I to V and of the total cross-sectional area and anatomical structure of the different internodes in *erectoides* mutants determined by members of the multiple-allelic series at loci *a* and *d* has indicated that each *ert* gene has a distinct phenotypic effect during development and differentiation and is usually characterized by a phase-specific action. The *ert* genes may behave conversely in two succeeding phases of development, these two phases being independent of one another and each possessing its particular mode of reaction to environmental conditions, such as level of N manure. All the organs of the plant are apparently influenced by the *ert* factors, and since every allele has an independent action in the different organs considerable variation in structural pattern ensues. The evolutionary significance of the *erectoides* forms is briefly discussed.

Experiments on Bonus and its mutant *ert* a^{23} showed that although the mutation strikingly altered the root system with respect to branching it did not affect the functioning of a physiological process such as uptake of P^{32}.

It is concluded from the study of *ert* mutants that analysis of 20 plants under uniform conditions in one single year, with respect to the following characters and in comparison with a standard barley, is sufficient to determine the degree of lodging resistance of a strain: (1) plant and internode length, (2) total cross-sectional area and anatomical details, and (3) root system.

164 *Nybom, N. Karyotype and viability in barley.* (*pp. 507–14*).

Experiments carried out for two years on the yielding ability of 19 lines of Bonus homozygous for different reciprocal translocations have indicated that chromosomal rearrangement does not appreciably affect this ability. The translocation lines, however, varied significantly in yielding capacity; a few lines outyielded the mother rows. The translocations were not associated with any unfavourable effects upon straw strength and earliness.

165 *Fröier, K. Aspects of the agricultural value of certain barley X-ray mutations produced and tested at the Swedish Seed Association, Svalöf, and its branch stations.* (*pp. 515–43*).

Experience gained in field trials of X-ray-induced mutants, chiefly of typical two-row *nutans* barleys, at Svalöf and the branch stations of the Swedish Seed Association is surveyed. Most of the mutants tested have been *erectoides* types. Problems concerning the agroecological properties of the mutants still require elucidation. Many mutants display considerably higher variations in yield than the best barleys recently put on the market. The author tentatively concludes that the majority of the promising mutants so far obtained will give their best performance (1) in seasons with optimum precipitation, (2) in districts with relatively good and favourably distributed rainfall and (3) on soils with satisfactory water-holding capacity. Mutants of Bonus and Maja have shown more favourable responses to high N-dressings than the parental controls and other commercial varieties. Vital mutants have been hybridized with new commercial varieties to study their mode of segregation and to provide material for selection.

166 *Åkerberg, E. Mutations in X-rayed material of the six-rowed barley variety Edda.* (*pp. 544–48*).

The X_2 of two lines, J38/432 (Edda II) and J38/444, both selected from Edda I, contained morphological variants, chlorophyll mutants and plants with various degrees of sterility. In general, the mutant types were similar to those induced in two-rowed barley. Lines selected from irradiated material of J38/432 differ from the standard Edda I in yield of grain and straw, stiffness and length of straw, earliness and 1000-kernel weight; they are expected to be valuable in breeding.

167 *Mac Key, J. Mutation breeding in polyploid cereals.* (*pp. 549–57*).

In general the rate of frequency of mutants in the X_2 is higher at the polyploid level than the diploid chiefly on account of the tolerance of chromosome rearrangement at the former level (cf. *PBA*, Vol. XXIV, Abst. 1838). Experiments

on the oats Klock II [Bell II] and Same and the wheats Scandia III and Svalöf Kolben have shown that in both cereals X irradiation may result in mutants with improvements in such characters as yield, quality, date of ripening, straw stiffness and 1000-kernel weight. In wheat, mutant lines with greater adult-plant resistance to stem rust have also been obtained. Agronomically valuable lines of Skandia III producing a high frequency of rogues were found to possess deficiency-duplications; such aberrations are therefore not necessarily deleterious.

168 *Gelin, O. E. V. X-ray mutants in peas and vetches.* (*pp. 558–68*).

Investigations carried out at the Weibullsholm Plant Breeding Institution on X-ray-induced mutants of pea and *Vicia sativa* are described. In both pea and vetch, vitality mutants, i.e. robust multibranched types, and minus characters, such as dwarfness, chlorophyll defects or inhibited flowering, have occurred in the X_2. When it has been possible to secure X_3 progenies of the minus mutants, they have consisted of normal individuals. The commercial variety Strålärt [Ray pea], a mutant of Kloster [Cloister], is an example of a vitality type (cf. *PBA*, Vol. XXIII, Abst. 2280). Another mutant of particular interest is a gigas form obtained from the fodder pea Parvus. Its gigas nature depends upon several genes; its mutant gene *d* for absence of *maculum* ring appears to be linked with the other altered genes. In small-scale tests it has considerably outyielded the mother line, chiefly as the result of its greater 1000-seed weight; it ripens a few days later than Parvus. The vitality mutants of vetch so far obtained are probably too late-maturing to be of practical value.

169 *Tedin, O. X-irradiation of* Lupinus luteus. (*pp. 569–73*).

In experiments at Svalöf, chlorophyll mutants have been induced more frequently than other types of changes, which include increased earliness, higher anthocyanin content, loss of resting period in the rosette stage, functional sterility, dwarf habit and loss of negative geotropism of the stem. The occurrence of a triple linked mutation is noted. Seasonal conditions have considerably affected the expression of some mutations. The early forms may be of practical value.

170 *Andersson, G. & Olsson, G. Svalöf's Primex White Mustard—a market variety selected in X-ray treated material.* (*pp. 574–77*).

Reasons are given for regarding Primex as the result of induced mutation of the genes for yield and oil content in the irradiated mother plant rather than merely as the outcome of selection (cf. *PBA*, Vol. XXI, Abst. 139). Selection within Primex has produced a strain, Sv 49/117, superior to Primex in yield and equal to it in oil content.

171 *Hagberg, A. & Nybom, N. Reaction of potatoes to X-irradiation and radiophosphorus.* (*pp. 578–84*).

From preliminary experiments on the development of suitable techniques for treating potato tubers with X rays or P^{32} and on the effects of such treatments, it was not possible to conclude which mutagen is preferable in practical breeding. X irradiation, however, induced two mutations and is easier to administer; P^{32} treatment did not result in any hereditary changes.

172 *Julén, G. Observations on X-rayed* Poa pratensis. (*pp. 585–93*).

The percentage of aberrants increased from 2·0% in the control material to just over 14% in plants obtained from seed lots exposed to 20,000 and 25,000 r. Some of the aberrants proved to be chimeras. The majority of the characters affected were morphological; most of the variants were smaller than normal. Only one mutant, with longer straw and leaves and larger tufts than the parental variety Fylking, appears to be of practical value. Variation in chromosome number had no effect upon sensitivity to X irradiation nor did the treatment influence chromosome number.

173 *Granhall, I. Spontaneous and induced bud mutations in fruit trees.* (*pp. 594–600*).

A short general review of the occurrence and value of bud sports is followed by an outline of work on the induction of somatic mutations in tree fruits by X rays, fast neutrons and other radiations at the Balsgård Fruit Breeding Institute (cf. *PBA*, Vol. XXIII, Abst. 2157).

174 *Gustafsson, Å. Mutations, viability, and population structure.* (*pp. 601–32*).

Chiefly with reference to Swedish investigations, the author discusses the following main topics: the expression of spontaneous or induced mutations in relation to population structure; the agricultural and evolutionary capacities of mutants as homozygotes and heterozygotes; the problem of the competitive ability of a mutant in relation to genotype interaction in a mixed population; the evolution of a new ecological reaction through mutation, such as the favourable response of *erectoides* forms of barley to high levels of N manure; and the

first stages of species formation. With regard to the latter, it is suggested that the association of locus mutation and chromosome translocation, such as that detected in a number of *ert* mutants of barley, may be the starting-point of a new species under natural conditions.

175 *Gustafsson, Å. & Tedin, O. Plant-breeding and mutations. Concluding remarks.* (*pp. 633–39*).

Induction of mutations is concluded to be an indispensable method of augmenting variability in modern crop breeding. Spontaneous and induced mutations are fundamentally similar, although the relative frequencies of variations due to chromosome breakage, intragenic changes and chromosome rearrangement arising through crossing-over in meiosis and mitosis may differ. Some artificial mutants directly increase agricultural fitness, others are useful in recombination. Chromosomal and genic mutation can to some extent now be controlled and directed by artificial means; the task ahead in the next few years is the more thorough understanding of the mutation process itself.

176 Fryxell, P. A.
A procedure of possible value in plant breeding.
Agron. J. 1954 : **46** : 433–34.

Literature on the selection of high osmotic pressure of the germinating seed as a possible means of obtaining material with improved commercial characters is surveyed, in the hope of stimulating research on the theoretical basis and practical potentialities of this procedure.

177 Baranov, P. A.
(Polyploidy for promoting Soviet agriculture).
Bot. Ž. (Bot. J.), Moskva 1954 : **39** : 157–79. [Russian].

The resumption of studies on polyploidy, suspended in the USSR since 1948 (cf. *PBA*, Vol. XVIII, Abst. 2000), is advocated on the grounds that some polyploids are of great practical value. A brief outline of recent research in eastern Germany, Sweden, Finland, Denmark, the Netherlands, Great Britain, India, Japan, Canada and the USA, besides some Soviet work described below, is given.

Wheat. Many amphidiploids developed by Žebrak (cf. *PBA*, Vol. XXIII, Abst. 1058) are valuable as breeding material and some have been used to breed new large-grained winter wheats possessing resistance to lodging and immunity to fungi.

Buckwheat. Tetraploids tested in Russia and the Ukraine include a population referred to in *PBA*, Vol. XXII, Abst. 2632. At Stavropolj, a high-yielding tetraploid variety has been obtained. At Minsk, crosses between autotetraploids have produced some amphidiploids that appreciably outyielded a local diploid variety in the 1953 trials.

Taraxacum. Navašin's tetraploid variety of *T. kok-saghyz* (cf. *PBA*, Vol. XXII, Abst. 2183), notable for its high root yields and good seed viability and rubber content, has recently been made a standard for some Russian, Ukrainian and White Russian districts.

178 van der Kley, F. K.
Male sterility and its importance in breeding heterosis varieties.
Euphytica, Wageningen1954 : **3** : 117–24.

On the basis of data from the literature, the author surveys the occurrence, mode of inheritance and practical significance of male sterility in crop plants.

179 L[eroy], J. F.
La vie et l'oeuvre du Professeur Aug. Chevalier. **(The life and work of Professor Aug. Chevalier).**
J. Agric. trop. Bot. appl. 1954 : **1** : 3–7.

This article is a contribution in honour of A. Chevalier, founder and editor of the original *Revue de Botanique appliquée et d'Agriculture coloniale*, subsequently known as *the Revue internationale de Botanique appliquée et d'Agriculture tropicale*, and now discontinued (cf. p. 106). Attention is drawn to (1) his work on the classification of economic plants and on the phytogeography of Africa; (2) his part in the organization of numerous missions to explore the floras of Indochina and Africa; and (3) his literary activities as editor of the above-mentioned journal.

180 **First Annual Report of the Agricultural Research Service.**
Deir Alla Res. Sta. Jordan 1952 : Pp. 20.

The objectives and activities of the Deir Alla Research Station in the Jordan Valley are described. The station commenced its work in 1951 and is mainly concerned with the testing of varieties of cereals, fibre plants and vegetables introduced into Jordan. Data on trials of cereals, cotton and potato are included.

181 Vasiljčenko, I. T.
(Using the wild flora of the USSR as initial breeding material and as material for experimental trials).
Bot. Ž. (Bot. J.), Moskva 1954 : **39** : 318–25. [Russian].

Investigation of the possible uses as breeding

material of wild varieties of grasses, legumes, fruit trees, vines, nuts and berries is advocated. In this connexion, recent expeditions to the Tien Shan and Gissar are mentioned.

Symposium on cooperative agricultural research in the Western Hemisphere.
Phytopathology 1954 : **44** : 391–421.

182 *Wellhausen, E. J. Modern corn breeding and production in Mexico.* (*pp. 391–95*).

The improvements in maize yields obtained in the different zones of Mexico by introducing selected varieties, synthetics and different types of F_1 hybrids are discussed. The use of synthetics consisting of the advanced generations of double top-crosses and other hybrid combinations has resulted in 15–26% increase in yield over selected varieties, which in turn outyield the old open-pollinated varieties by 15–50%. By the introduction of hybrids involving S_1 lines an increase of 29–41% over the selected varieties has been achieved. Hybrids obtained by using advanced-generation selfed lines are more uniform and disease resistant than hybrids from S_1 lines but do not give higher yields. Utilization of S_1 lines is considered to have several advantages under present conditions in Mexico.

183 *Jenkins, M. T. Cooperative uniform testing of corn inbreds and hybrids.* (*pp. 396–98*).

The chief aims and achievements of cooperative regional maize tests carried out in the United States since 1933, and more recently in Europe and the Middle East under the auspices of FAO, are discussed. The conditions found essential for effective cooperation are briefly described.

184 *Borlaug, N. E. Mexican wheat production and its role in the epidemiology of stem rust in North America.* (*pp. 398–404*).

Epidemiological aspects, breeding for stem-rust resistance and changes in the prevalence of races of the fungus are considered. With the rapid increase in the prevalence of races 15B, 49 and 139 in Mexico during the past three years, the resistance of the improved varieties recently distributed is no longer satisfactory. Multiplication of three new wheats apparently carrying combined resistance to these three races and to the five formerly common races has been initiated. The value of composite varieties consisting of mechanical mixtures of lines genotypically different with respect to their rust reaction is being explored.

185 *Hanna, W. F. Progress in the control of wheat stem rust in Canada.* (*pp. 404–05*).

Some of the main features of Canadian work on the stem-rust pathogen and breeding for resistance to it are outlined. Seventy-five races and biotypes of stem rust have so far been found.

186 *Niederhauser, J. S., Cervantes, J. & Servín, L. Late blight in Mexico and its implications.* (*pp. 406–08*).

In Central Mexico the highly specialized races of *Phytophthora infestans* are among the prevalent field races (cf. *PBA*, Vol. XXIV, Abst. 431). A considerable number of isolates have been identified by means of the series of differentials developed by Black and by Reddick *et al.*, a close correlation between the two sets of differentials being discernible. No clone of *Solanum demissum* has proved to be resistant to all the most highly specialized races (cf. *PBA*, Vol. XXIV, Abst. 1226). Clone S–74 of this species, resistant to one group of highly specialized isolates, apparently possesses a fifth gene for late-blight resistance. Among the other species tested, one clone of *S. bulbocastanum* has remained free from blight, and the 3*n* form of *S. cardiophyllum* has proved to be highly resistant; other species are blighted fairly readily. The view is expressed that "partial" resistance, i.e. field resistance or tolerance, due to major and minor genes, offers a more hopeful means of breeding resistant commercial varieties than racial resistance based on single major genes or limited combinations of such genes.

187 *Doolittle, S. P. The use of wild* Lycopersicon *species for tomato disease control.* (*pp. 409–14*).

Investigations on the inheritance of disease resistance and on breeding for this property in the United States, using *Lycopersicon pimpinellifolium* and other wild species, are discussed. The survey deals with the following diseases: *Phytophthora infestans*, *Verticillium* wilt, *Alternaria solani*, *Cladosporium fulvum*, *Stemphylium solani*, *Fusarium* wilt, *Septoria lycopersici*, bacterial diseases, root knot caused by *Meloidogyne* spp., and the tobacco-mosaic, spotted-wilt and curly-top viruses.

188 *Silberschmidt, K. Potato viruses in the Americas.* (*pp. 415–20*).

Research on potato viruses is surveyed, chiefly

with reference to the identification of different viruses, seed-potato production and breeding for resistance in South and Central America. The Andean region is regarded as the centre of dissemination of the potato viruses.

189 *Stakman, E. C. People, pathogens, and progress in international disease control.* (*p. 421*).

International control in testing crop varieties for disease resistance, the determination of new races of pathogens and tackling other phytopathological problems is advocated.

190 Gorlenko, M. V.
(**Achievements in plant pathology in the Bulgarian People's Republic**).
Priroda (Nature), Leningrad 1954 : No. 9 : 67–70. [Russian].

This brief survey of Bulgarian research on plant diseases includes notes on breeding for disease resistance.

Wheat. Varieties showing resistance to black, yellow and brown rust have been developed.

Potato. Breeding for resistance to bacterial wilt is in progress. Some German, Czechoslovak, Polish and Dutch varieties showed a high degree of resistance.

Tobacco. Mention is made of Hybrid 888, from *Nicotiana tabacum* x *N. glutinosa*, which possesses resistance to *Phytophthora*, tobacco mosaic virus and *Thielaviopsis basicola*.

Sunflower. Vegetative hybrids between sunflower and *Xanthium strumarium* gave progenies showing improved resistance to *Plasmopara*.

Plum. Reference is made to the varieties Žălta Afăska [Yellow Afăska] and Červena Ranna [Early Red]. Both are resistant to rust, red spot and several viruses.

Tomato. Hybrids resistant to *Verticillium dahliae* were obtained by crossing cultivated varieties with the currant tomato.

191 s'Jacob, J. C.
Doel en werkwijze van de resistentie afdeling van het I.P.O. (**Aim and method of the Resistance Department of the IPO**).
Landbouwvoorlichting 1954 : **11** : 385–94.

The work of the Department of Disease Resistance of the Netherlands Institute of Plant Pathology is described. The primary object of the department, which was founded in 1951, is to advise breeders on matters relating to breeding for disease resistance and to assist them in their search for resistant material. The article includes a short, popular account of recent progress made in various countries in the breeding of resistant varieties of crops, problems arising from the occurrence of new physiological races, and methods used at the institute for testing for disease resistance.

192 Wassenaar, R., Korteweg, G. A. & Vos, H.
Vorstschade aan de rassen van landbouwgewassen in de winter van 1953–1954. (**Frost damage to varieties of crop plants in the winter of 1953-54**).
Landbouwvoorlichting 1954 : **11** : 413–23.

Differences in frost resistance of varieties of wheat, barley, rape, lucerne, clover and ryegrass are noted. Of winter wheats cultivated in the Netherlands, Heine VII, Carsten's V and Elisabeth proved most resistant. Of the winter barleys, Vinesco suffered considerably less than any other variety.

193 Lackamp, J. W.
Plantenveredeling ten behoeve van droge gronden. (**Breeding plants for cultivation on dry soils**).
Landbouwk. Tijdschr., 's-Grav. 1954 : **66** : 605–12.

The question of breeding for resistance to drought in crop plants is discussed in general terms and a brief survey of investigations into the problem given. Various theories as to the physical basis of drought resistance are examined and it is emphasized that there are two types of resistance, i.e. tolerance of dry soil and tolerance of dry atmospheric conditions. Results achieved in the breeding of varieties of cereals, grasses, root crops and fodder plants with a high degree of drought resistance are summarized and the economic importance in the Netherlands of cultivating drought-tolerant types is pointed out.

194 Suhov, K. S.
(**Virus diseases of agricultural plants and measures of controlling them**).
Izv. Akad. Nauk SSSR (News Acad. Sci. USSR) 1954 : No. 3 : 49–61. [Russian].

In describing a number of virus diseases of agricultural plants and measures that have been adopted successfully in the USSR for their control, reference is made to the breeding of virus-resistant forms of tobacco and cotton and to experiments in which the green cucumber-mosaic virus was converted to the white mosaic virus by growing the cucumbers at a temperature of 37–40° C.

Proceedings of the Tenth Annual Meeting of the North Central Weed Control Conference, December 10, 1953, and abstracts of papers presented at First National Weed Control Conference, December, 8, 9, 1953, Kansas City, Missouri : Pp. 88.

195 *Dunham, R. S. Screening breeding stocks for herbicidal tolerance.* (*pp. 33–34*). (*Abst.*).

In expressing the view that response to herbicides should be included among the characters tested in developing new varieties, the author refers to recent investigations at the Minnesota University Farm showing that the response of flax varieties to 2,4-D is genetically controlled. Since 2-methyl-4-chlorophenoxyacetic acid (MCP) has proved to be more satisfactory than 2,4-D in the case of flax, breeding stocks of this crop are now being screened for response to the former; in future, when a variety is released, information on its reaction to MCP is to be included in its description.

196 *Elder, W. C. Weed control in sorghums.* (*pp. 43–44*). (*Abst.*).

In tests over a six-year period at the Oklahoma Agricultural and Mechanical College, sorghum varieties have exhibited differences in reaction to 2,4-D treatment. Measurement of root injury by estimating the force necessary to pull the plants from the soil gave a better index of varietal response than data on grain yield.

197 *Buchooltz, K. P. Varietal responses of corn to herbicides.* (*pp. 47–49*). (*Abst.*).

Ways in which maize inbreds and hybrids vary in their response to herbicides, chiefly 2,4-D, are discussed, attention being given to methods of determining varietal differences more accurately. It is suggested that the most constructive approach to the practical problem of varietal differences in sensitivity to herbicides is the use of tolerant inbreds to produce hybrids not likely to be injured by more liberal applications than those at present recommended.

CEREALS

198 Séguéla, J. M. & Jacquard, P.
Les variétés de céréales cultivées en Tunisie. (**Varieties of cereals cultivated in Tunisia**).
Tunis 1954 : Pp. 17.

Data on yield and quality of grain, morphological characters and degree of resistance to rust, lodging and drought are presented for the main varieties of wheat, oats and barley cultivated in Tunisia.

199 Meurman, H.
Kevätviljalajikkeet Karjalan kasvinviljelyskoeasemalla Anjalassa. (**Spring cereal varieties at the Karelian Experimental Station at Anjala**).
Koetoim. ja Käytäntö 1953 : No. 3 : p. 4.

Data on yield, strength of straw and growing period are given for a number of varieties of spring wheat, oats and barley tested during 1941–52. The spring wheat Timantti [Diamond], the barley Balder and the oat variety Sisu [Courage] are recommended for cultivation in Finland.

200 Kress, H.
Sortenwertlinien und Anbauzonen. (II. Teil: Sommer-Getreidesorten). [**Varietal evaluation curves and zones of cultivation. (Part II : Spring cereal varieties)**].
Dtsch. Landw., Berl. 1954 : **5** : 238–42.

Data on the optimal zones of cultivation of authorized East German varieties of spring wheat, oats and barley are presented. This information was based on observations made at seven centres in East Germany during the period 1949–53 in an attempt to elucidate the relationship between variety and environment in the more important German crop plants (cf. *PBA*, Vol. XXIV, Abst. 3111).

201 Kress, H.
Sortenwertlinien und Anbauzonen. (III. Teil: Wintergetreidesorten). [**Varietal evaluation curves and zones of cultivation. (Pt. III : Winter cereal varieties)**].
Dtsch. Landw., Berl., 1954 : **5** : 410–14.

The relationship between varietal performance and the environment in which a crop is grown is further (cf. *PBA*, Vol. XXIV, Abst. 3111) exemplified by an analysis of the yields and regional adaptation of winter varieties of barley, rye and wheat, when grown in various localities in Eastern Germany.

202 Fajersson, F.
Svenskt vete bra—kan bli bättre. Spannmålens kvalitetsfrågor diskuterade i Tyskland. (**Swedish wheat is good, but can become better. Questions of grain quality discussed in Germany**).
Lantmannen, Stockholm 1954 : **38** : 190, 200.

At an international conference of the corn trade in Detmold, Western Germany, P. Pelshenke pointed to Sweden and Switzerland as two countries that have shown that in cereal

breeding quality can be combined with high yield. Sweden has also been successful in breeding varieties whose flour has the desirable milling quality of grittiness.
The Swedish tetraploid rye, with its low hectolitre weight and special milling problems, should not be compared by the grower with diploid rye, but should be regarded as a new kind of crop. In Switzerland and Austria, Tetra rye is used for the production of medicinal ergot; and in the latter country tetraploid rye is being used to breed lines particularly susceptible to the ergot-producing fungus.

203 Nordiska försöksmän på studieresa i Skåne. (**Scandinavian research workers on a study tour in Skåne**).
Lantmannen, Stockholm 1954 : **38** : 707–08.

During this tour in 1954, visitors from Norwegian and Danish research groups heard a series of talks on cereal breeding at Svalöf, Weibullsholm and other Swedish experimental centres. Points discussed included (*a*) winter hardiness of autumn wheat particularly in Skåne and the causes of deficient overwintering capacity in cold resistant wheats; (*b*) promising spring wheat yields obtained from crosses between Kärn II [Kernel II] and Pondus; and (*c*) the resistance of certain barley selections to lodging in a very wet year.

204 Derenne, P.
Application du test du chlorure de 2,3,5-triphenyltetrazolium aux plantules de céréales endommagées par le froid. (**Application of the 2,3,5-triphenyltetrazolium chloride test to seedlings of cereals damaged by cold**).
Bull. Inst. agron. Gembloux 1954 : **22** : 155–56.

The probable stand from frost-damaged plots after recovery can be estimated by the use of the above test for determining the germination capacity of the embryo by "topographical" identification of the still viable areas in the seed. The ratio of seedlings showing good viability to the total number examined should give a good idea of the survival rate.

205 Sibilia, C.
Recenti ricerche sulle ruggini dei cereali. (**Recent research on the rusts of cereals**).
Boll. Staz. Pat. veg. Roma 1953 (1954) : **11** : 73–82.

Based on a bibliography of 47 references, this review covers the work done in various countries on biological races of cereal rusts, breeding for resistance and other control measures.

206 Gray, E. G.
Smut diseases of cereals in the north of Scotland.
Plant Path. 1954 : **3** : 59–62.

The occurrence of loose and covered smuts upon commercial oats and barleys in northern Scotland is surveyed; loose-smut infection of the stiff-strawed Scandinavian barleys is particularly noticeable.
The smut resistance of the Welsh variety S171 (*Avena strigosa* x *A. brevis*) has broken down in the Outer Hebrides. Evidence has been obtained that at least two strains of covered smut of oats are present in northern Scotland, S171 being susceptible to the Hebridean form; no racial differentiation in loose smut has so far been detected. In tests of material forming the basis of breeding varieties for the vigorous conditions of the shell-sand areas of the islands, lines of *A. strigosa*, *A. brevis* and *A. barbata* x *A. brevis* have exhibited resistance to a mixed inoculum of all collections of loose and covered smuts; they are to be tested for their response to separate collections.

WHEAT

207 Titta, G.
Le nuove razze di grano dell'Istituto di Cerealicoltura di Pisa. (**The new wheat varieties of the Institute for Cereal Cultivation at Pisa**).
Ann. Fac. Agr. Pisa 1953 : **14** : 67–86.

In the period 1946–53 a number of further crosses have been effected and observations continued on later generations of others. It was noticed that some advanced generation hybrids grown at several places gave rise to certain segregates only at one of the places where the hybrid was grown and not at others. Several new forms selected for high yielding ability combined with resistance to rust and lodging are described and illustrated.

208 Avanzi, E.
Nuove razze di grano. (**New varieties of wheat**).
Ann. Fac. Agr. Pisa 1953 : **14** : 99–116.

The wheat Ancona, from Frassineto 405 x Marchetti 114, is giving good yields both in the plains of central Italy and in the hill districts; Trento, from Inallettabile 3 x Mentana, does well in hill tracts of medium altitude, between 700 and 800 m., where it ripens 10 days before the varieties previously grown there; Pisa, from Mentana x Inallettabile 8, is well adapted to

soils of low fertility; Brescia, from Precocissimo Chinese [Very early Chinese] x Inallettabile 3, is capable of producing exceptionally high yields on rich land without lodging; and Cremona, from Frassineto 405 x Marchetti 114, is exceedingly early, and yet has given yields exceeding 50 q. per ha. Descriptions and illustrations of these varieties are presented.

209 Pesola, V. A.
Jokioisten uudet kevätvehnäjalosteet Apu, Kiuru ja Touko. (**New spring wheats from Jokioinen: Apu, Kiuru and Touko**).
Koetoim. ja Käytäntö 1953 : No. 2 : p. 1, 4.

Extensive comparative trials of a number of well-known spring wheats in several different localities of Finland are described. Special attention is devoted to the three new varieties Apu [Aid] (Garnet x Pika [Express]), Kiuru [Lark] (Aurore x Sopu [Concord]) and Touko [Sowing] (Timantti [Diamond] x Hopea [Silver]). The comparative data tabulated include length of growing period, yield, strength of straw, percentage germination and baking qualities.
Apu is a very early variety, suitable for the most northern areas of cultivation as well as for others; it matures nearly two weeks before Timantti, which it resembles in strength of straw and baking qualities, and yields well.
Kiuru is a midlate variety, ripening between Sopu and Timantti. It yields better than Sopu or Tammi and is at least equal to Timantti and its baking quality is better than that of Timantti. Its resistance to lodging is similar to that of Timantti.
Touko is also a midlate variety and resembles Timantti in yielding capacity; on arid soils it is more successful than Timantti. Its baking qualities are better than those of Timantti, and rather similar to those of Timantti II. Its resistance to lodging is distinctly better than that of Timantti.

210 Marjanen, H.
Kevätvehnälajikkeiden satoisuus paikalliskokeissa. (**The productiveness of spring wheat varieties in local experiments**).
Koetoim. ja Käytäntö 1953 : No. 12 : p. 4.

The behaviour and yields of several varieties of spring wheat, including foreign introductions, tested at different centres in Finland, are compared.

211 Wintertarwe, 1954. (**Winter wheat, 1954**).
Landbouwvoorlichting **11**: Bijl. 30; Ber. Rassenkeuze No. 172 : 1954 : unpaginated.

Tabulated data on the relative yields of 22 varieties tested on different types of soil in the Netherlands are presented and brief descriptions of each variety given. Of the 14 varieties with a high degree of winter hardiness, Heine's VII proved highly productive on all types of soil and Werla and Carsten VIII also gave high yields. Of the less winter-hardy varieties, Minister and Nord Desprez proved superior.

212 Pal, B. P.
The improvement of wheat in India.
Sci. & Cult. 1954 : **19** : 540–49.

An abbreviated version is given of the presidential address to the Agricultural Sciences Section of the Forty-first Session of the Indian Science Congress Association, held at Hyderabad, January, 1954. Progress already achieved in India in breeding for rust resistance and other characters is surveyed, and future breeding for disease resistance and for adaptability to special conditions is discussed with reference to the cytogenetics of interspecific and intergeneric crosses and to the physiological approach.

213 Reitz, L. P.
Wheat breeding and our food supply.
Econ. Bot. 1954 : **8** : 251–68.

A popular history of wheat breeding in the USA over the past 50 years is given, together with an account of the varieties at present cultivated in different parts of the country and their genealogy. The aims of the wheat breeding programme are outlined, special emphasis being placed on the importance of resistance to diseases and pests and data are presented on increases in yield obtained in recent decades by the cultivation of improved varieties.

214 Shier, F. L. & Reeves, J.
Wheat variety trials on research stations, 1953.
J. Agric. W. Aust. 1954 : **3** : 365–70.

The results of trials of new and standard varieties in Western Australia during the 1953–54 season are summarized.
Four unnamed varieties, developed at the Merredin Research Station, showed promise and are to be further tested, viz. M107 and M109, both from Kenya C6041 x Eureka 11, and M114 and M115, both selections of [Eureka 11 x M60 (Sword x Kenya C6041)]. Like Dowerin, Festival and Panther, these new varieties are resistant to all races of stem rust known to occur in the State.

215 Ryžeĭ, I. P.
(Breeding winter wheat for size of grain).
Zemledelie (Agriculture) 1954 : No. 5 : 110–11. [Russian].

All secondary ears are removed on hybrid plants and only the main ear is allowed to develop, or all the lateral florets are removed and only the central grains allowed to develop. By performing these operations for six generations it is claimed that the grain size of the hybrids has been increased.

216 Orlov, V. N.
(The behaviour of winter wheats sown in spring and then in autumn).
Agrobiologija (Agrobiology) 1954 : No. 3 : 103–06. [Russian].

At Kinelj, some winter wheats sown in the spring for several generations with partially vernalized seed changed suddenly into spring wheats and bore pubescent leaves. The number of generations required to produce this change varied from two to four according to variety. Some of the new spring wheats obtained by this method proved as hardy as the initial winter forms; others became less hardy.

217 Ponamarčuk, M.
(Experience in growing cereals for high yields).
Socialist. Seljsk. Hozjaĭstvo (Socialist Agric.), Moscow 1954 : No. 8 : 15–25. [Russian].

An account of new varieties on display at the 1954 Moscow Agricultural Exhibition is given. These included new spring wheats developed at Tulun that mature 10–15 days earlier than Lutescens 62, the high-yielding winter wheat Zenitka [Zenith], selected at Harjkov from Hostianum 237, and a number of wheat-*Agropyron* hybrids developed at the Grain Institute for the Nonchernozem Belt. The wheat-*Agropyron* hybrids included productive forms with a perennial habit.

218 Leiser, M.
Die Bastardierung von Weizen und Roggen auf Grund experimenteller Untersuchungen unter besonderer Berücksichtigung der zytologischen Verhältnisse und deren Beziehungen zu äusseren und inneren Eigenschaften. **(The hybridization of wheat and rye on the basis of experimental investigations with special consideration of cytological relationships and their bearing on external and internal properties).**
Z. Pflanzenz. 1954 : **33** : 59–98.

At the Institute for Agricultural and Horticultural Crops, Weihenstephan, Germany, 59 lines of wheat-rye hybrids, comprising amphidiploids ($2n = 56$), hypoploids derived from the amphidiploids and possessing a complement of from 48 to 54 chromosomes, and plants with the same number of chromosomes as the *Triticum* parent ($2n = 42$), were studied during the period 1948–51. Most hybrids were intermediate in morphological characters between the two parent forms, although some rye characters, such as pubescent stem, proved dominant. Considerable differences were noted in such physiological properties as rate of growth and resistance to lodging, diseases and frost, the resistance of the rye parent to several races of mildew and rust tending, however, to be dominant. Considerable difficulties were experienced in pollination; in back-crosses it was found that the pollination of hybrids with wheat pollen was more successful than with rye pollen. The fertility of the amphidiploid lines was increased by crossing them with the F_1 of wheat x rye hybrids possessing a chromosome complement of $2n = 42$. The progeny of such crosses were mainly amphidiploids. Cytological studies of root-tip cells indicated that mitosis was regular; meiosis in the pollen mother cells was, however, irregular, numerous fragments being observed. It was not possible to distinguish between wheat and rye chromosomes in either mitosis or meiosis. The appearance and quality of the grain were mainly intermediate between wheat and rye, although a large proportion of shrivelled and deformed seeds were observed. In most cases the maltose content of the hybrid grain was high, this character being inherited from the rye parent. It is concluded that the amphidiploid hybrids offer the best possibility of combining the wheat and rye chromosomes.

219 Marshall, H. G. & Schmidt, J. W.
A study of the meiotic stability of certain Agrotricum hybrids.
Agron. J. 1954 : **46** : 383–88.

"Advanced generations of Agrotricums which appeared to be stable for disease reactions and for morphological characteristics were found to be, in general, highly unstable meiotically.

"The meiotic indices of the lines were correlated with percentage of normal pollen, kernel-weight index, and percentage of seed germination. They were not correlated with the percentage of seed set when plants were self-pollinated or open-pollinated. The percentage of normal pollen was not correlated with percentage of seed set.

"Segregation of genetic factors influencing meiotic stability, selection pressure, and natural

outcrossing are suggested as contributing toward persistence of meiotic instability in the Agrotricum hybrids." [Authors' summary].

220 Vatulja, E. E. & Kučumov, P. V.
(Obtaining new forms of wheat by vegetative hybridization).
Agrobiologija (Agrobiology) 1954 : No. 3 : 68–72. [Russian].

Descriptions are given of the first to fourth seed generation of an intergeneric vegetative hybrid between wheat and rice. The hybrid was obtained at Harjkov by grafting the embryo of a *Triticum vulgare* hybrid, Artemovka x Milturum 37–61, on to the endosperm of *Oryza sativa* 'Zeravšanika 0427'. High-yielding material has been selected for further improvement by continuous selection or hybridization with unspecified wheat varieties. This material includes a tall, white-grained F_4 hybrid, with longer and more productive ears than the standard Artemovka.

221 Wunderlich, G.
Der Stand unserer heutigen Kenntnisse über die Ursachen und die Grösse des Kornausfalles, insbesondere einiger österreichischer Weizensorten. **(The state of our present knowledge of the causes and extent of grain shedding, especially of some Austrian wheat varieties).**
Z. Pflanzenz. 1954 : **33** : 285–302.

An extensive survey of the literature on the subject is presented, together with the results of experiments conducted at the Institute for Crop Cultivation and Breeding of the University of Agriculture, Vienna. Of eleven wheats tested, the three awned varieties Marchfelder, Kadolzer III and Austro Bankuter suffered least from shedding; of the remaining eight varieties, which were awnless, Lassers Dickkopf [Lasser's Squarehead] and Carsten V lost least grain in this way. Correlations were established between resistance to shedding and the following genetically determined characters: (1) density of ear, the dense-eared varieties displaying least shedding; (2) extent of glume opening, varieties with a high proportion of open glumes being most inclined to shedding; (3) rachilla strength; (4) strength of glume attachment; and (5) 1000 grain weight, large-grained varieties being most inclined to shedding. In rye, ear density and 1000 grain weight were the most decisive factors in determining extent of shedding.

222 Butkevič, V. V.
(Growing conditions of wheat in relation to protein content).
Agrobiologija (Agrobiology) 1954 : No. 3 : 44–54. [Russian].

The amount of protein produced by most varieties depended to a greater extent on grain yield than on protein content, though some wheats such as Kamalinka E–223 gave a large amount of protein in spite of a relatively low grain yield. The protein content of all wheats varied according to environment, each variety displaying a different response to a given environment.

223 Jakovlev, M. S. & Snegirev, D. P.
(The effect of growth substances upon the development of polyembryonic grains in wheat).
Bot. Ž. (Bot. J.), Moskva 1954 : **39** : 187–94. [Russian].

Dusting the ears of the wheat Melanopus 069 with parachlorophenoxyacetic acid caused the formation of supplementary embryos. The phenomenon is attributed to vegetative polyembryony, which is regarded as of evolutionary significance. In some grains the supplementary embryos did not complete their development and their germinating shoots fused into one plant. This process is termed embryonic polymerism.

224 Mac Key, J.
The taxonomy of hexaploid wheat.
Svensk bot. Tidskr. 1954 : **48** : 579–90.

It is proposed that all the hexaploid wheats be relegated to a single species *Triticum aestivum* L. em. Thell., with the following subspecies: *compactum* (Host) Mac Key; *sphaerococcum* (Perc.) Mac Key; *vulgare* (Vill., Host) Mac Key; *spelta* (L.) Thell.; and *macha* (Dek. et Men.) Mac Key. *T. compositum* Vav. and *T. vavilovi* (Tum.) Jakub. are not regarded as sufficiently well-defined to warrant inclusion in the scheme. The author recommends that futher taxonomic subdivision be made by means of cultivars.

225 Zannone, L. & Fabbretti, M. C.
Variabilità di alcuni caratteri istologici del culmo di frumento. **(Variability of certain histological characters of the wheat stem).**
Ann. Sper. agr. 1954 : **8** : 1227–37.

As a preliminary to attempting to use them in breeding for standing capacity, a study was made of the variation of the characters area of cross section, area occupied by the wall of the culm, area of sclerenchymatous tissue, number

of vascular bundles and area occupied by vascular bundles, in four Italian wheat varieties differing in their strength of straw. Only the thickness of the wall of the culm showed any correlation with the lodging resistance of the variety.

226 Laričeva, M. D.
(Effect of the mode of training of hybrids upon the formation of their yield characters).
Agrobiologija (Agrobiology) 1954 : No. 3 : 55–63. [Russian].

At the Timirjazev Agricultural Academy, the formation of characters determining high yield in spring wheat was promoted by training upon rich soil, F_1 hybrids trained in this manner giving higher yields than either parent. Selection for high yield in the F_1 resulted in an F_2 with still higher yields.

227 McNeal, F. H. & Davis, D. J.
Effect of nitrogen fertilization on yield, culm number and protein content of certain spring wheat varieties.
Agron. J. 1954 : **46** : 375–78.

No significant variety x fertilizer interactions for yield and number of head-producing culms were detected in experiments carried out on nine wheats during 1953 at Bozeman, Mont. Within a single ear, the first-formed and earlier maturing kernels had the highest protein content. Varietal differences were found in the relationship between the protein contents of the central and lateral spikelets and between those of the middle and top spikelets; the average protein percentages for different parts of the head were however highly correlated.

228 Aufhammer, G.
Was lehren uns die schweren Auswinterungsschäden im Winterweizenanbau?
(What does the severe damage due to winter killing in winter wheat growing teach us ?)
Mitt. dtsch. LandwGes. 1954 : **69** : 846–49.

Methods which the German farmer can adopt to counteract the effects of severe winter weather include the choice of a suitable winter hardy variety. The technique used at Weihenstephan and Gliesmarode, Germany, in breeding and testing for winter and spring hardiness and for the capacity for recovery from winter damage is briefly described. A list of wheats is given showing the varietal differences in winter hardiness.

229 Fajersson, F.
Bancovetets övervintring i Skåne och Östergötland vintern 1953–54. **(Overwintering of Banco wheat in Skåne and Östergötland during the winter of 1953-54).**
Weibulls Årsb. 1954 : 1–7.

Further trials have confirmed the good overwintering capacity of Banco (cf. *PBA*, Vol. XXIV, Abst. 193). As well as withstanding the normal winters of south-west Sweden, Banco is superior to all the commercial varieties in grain yield, and ripens earlier and is of better quality than other southern Swedish varieties, while equalling Eroica in strength of straw.

230 Sallans, B. J. & Simmonds, P. M.
The influence of variety and predisposing factors on the occurrence of yellow berry (starchiness) in wheat.
Canad. J. agric. Sci. 1954 : **34** : 393–405.

Experiments carried out by the Botany and Plant Pathology Division of the Department of Agriculture, Ottawa, indicated that the occurrence of yellow berry is due to an increase in carbohydrates in relation to proteins, or to a shortage of nitrates in the soil. In greenhouse tests of a number of varieties, Garnet and Regent proved least susceptible to the disease.

231 Ray, D. A., Hebert, T. T. & Middleton, G. K.
Inheritance of resistance to powdery mildew in wheat.
Agron. J. 1954 : **46** : 379–83.

The inheritance of mature-plant resistance to natural infection with *Erysiphe graminis* var. *tritici* under field conditions was analysed in eleven crosses involving the resistant wheats Suwon 92, Huron, Norka, Axminster, Normandie and Converse, the susceptible varieties Atlas 50, Hardired and Ulka and the moderately resistant wheat Chul. In each cross of the type resistant x susceptible variety, resistance was dominant and monogenically determined; Axminster differed from Chul by two major factors for resistance. Axminster appeared to possess at least one gene for mature-plant resistance in common with Norka, Normandie, Huron and Converse; probably Suwon 92 and Normandie also carry a common factor conditioning resistance. Ten of the crosses were also studied for their seedling reactions to four powdery-mildew collections under greenhouse conditions; all of the single major factors found to govern seedling resistance to the different collections were apparently closely linked in each of the resistant wheats studied, except for the Chul gene for

resistance to collection 10. In Suwon 92 glume pubescence was closely associated with seedling resistance to collection 46.

232 Manners, J. G. & Gandy, D. G.
A study of the effect of mildew infection on the reaction of wheat varieties to brown rust.
Ann. appl. Biol. 1954 : **41** : 393–404.

Studies conducted at the Department of Botany of the University of Southampton on the effect of the presence of *Erysiphe graminis* var. *tritici* on the susceptibility of five varieties of wheat to attack by *Puccinia triticina* showed that in the case of Malakoff and Democrat the presence of mildew led to an increase in the incidence of rust; in addition, continuous exposure to daylight and artificial light enhanced the effect of mildew on the reaction of Democrat to rust. Infection of Mediterranean, Hussar and Webster with mildew had no significant effect on their degree of susceptibility to rust.

233 Cymbal, M. M.
(The resistance of winter wheat to bunt in relation to external conditions).
Agrobiologija (Agrobiology) 1954 : No. 3 : 64–67. [Russian].

Experiments at Dnepropetrovsk showed that the varieties Odessa 3 and Ukrainka 246 became less susceptible to bunt when they were sown early for several generations. A higher degree of resistance in these varieties was also obtained when their seed had been allowed to reach full maturity.

234 Urríes, M. J.
Efecto de la temperatura en el tipo de reacción de las variedades diferenciales inoculadas con varios aislamientos de *P. rubigo-vera tritici*. **(Effect of temperature on the type of reaction of the differential varieties inoculated with various isolations of *P. rubigo-vera tritici*).**
An. Jard. bot. Madr. 1954 : **1** : 247–63.

The differential varieties reacted differently to changes in temperature; Brevit, Carina, Loros and Hussar became on the whole more susceptible with rising temperature and Democrat, Webster and Mediterranean more resistant, but the actual differences varied also for different physiological races. It would therefore seem desirable to combine many of the races of this fungus, for practical breeding purposes, into groups of roughly similar behaviour, particularly those differentiated by Democrat. The races distinguished by the use of the variety Brevit, on the other hand, are regarded as having a real significance, at least as far as conditions in Spain are concerned.

235 Omar, A. -A. M.
Inheritance of reaction to race 15B and some other races of stem rust of wheat.
Diss. Abstr. 1954 : **14** : Publ. No. 8133 : 903–04. (Abst.).

Investigations were carried out on the inheritance of field reaction to stem rust and of seedling reaction to race 15B at 80–85° F in 24 crosses involving the following 12 spring wheats: Egypt. x Frontana selection, Egypt. NA95, Egypt. NA101, Kenya 58, Kenya 117A, Kentana, Marquis selection, Timstein x Henry selection, Lee, Lerma, Mida and Thatcher. Field resistance to a collection of races was controlled by genes at two complementary loci, *R* and *S*. The genotype *RS* was resistant, *R*^{1}*S* moderately resistant; *Rs* and *rs* combinations were susceptible, *R*^{1}*s* and *rs* highly susceptible. Seedling reactions to 15B at 80–85° F depended upon two loci, *T* and *W*. Four alleles occurred at *T*, viz. *T* for immunity, T^1 for resistance, T^2 for moderate resistance and *t* for susceptibility. The allele *W* caused moderate susceptibility, *w* susceptibility; *T* was epistatic to *W*. The parental varieties were grouped into five classes: *Tw*, immune; T^1w, resistant, T^2w, moderately resistant; *tW* moderately susceptible; and *tw*, susceptible. The gene B_1 for awnlets was dominant to b_1 for full development of awns, and *Wx* for nonwaxiness was dominant to *wx* for waxiness.

Inheritance of earliness was explained on the assumption of four factors, viz. *A* and *B* for earliness, and *C* and *D* for winter habit.

The above-mentioned characters were inherited independently in most of the crosses but significant associations of field reaction to stem rust with awnedness and with seedling response to 15B and of earliness with awnedness were detected in some crosses.

Dwarfness in three crosses segregated according to a digenic ratio of 13 : 3.

236 Barrett, R. E. & McLaughlin, J. H.
Disease-resistance factors in wheat.
J. Agric. Food Chem. 1954 : **2** : 1026–29.

"Electrophoretic and chromatographic studies of aqueous protein extracts of Pawnee (a disease-resistant wheat) and Michigan Amber (a susceptible wheat) wheat seedlings showed differences in protein characteristics between the healthy and diseased Michigan Amber plants and no protein difference between the

healthy and diseased Pawnee plants. The infectious agent used was race 9 of *Puccinia triticina*. Extracts from the infected Michigan Amber plants showed, by the application of these methods, a lower amino nitrogen and greater carboxyl content of the aqueous protein than was found in the healthy plants. Electrophoretic analysis showed that the aqueous protein extract from diseased Michigan Amber plants had a greater negative mobility than that from the healthy plants. The susceptibility of Michigan Amber wheat seedlings to race 9 of *Puccinia triticina* may be associated with high content of amino nitrogen and/or low carboxyl content or with a high ratio of amino nitrogen content to carboxyl content."

[Authors' summary].

237 **New stem rust resistant wheat released for seed increase.**
Seed World 1954 : **74** : No. 10 : p. 16.

Willet spring wheat added to Minnesota variety list.
What's New Crops Soils 1954 : **6** : No. 9 : p. 28.

The spring wheat Willet (Frontana x Thatcher), released by the US Department of Agriculture, is resistant to race 15B as well as to the other races of stem rust. It is more tolerant of scab than the Canadian stem-rust resistant variety Selkirk (McMurachy-Exchange x Redman) and its milling and baking properties are satisfactory.

238 Stoa, T. E.
Which wheat shall we grow in 1954.
Bi-m. Bull. N. Dak. agric. Exp. Sta. 1954 : **16** : 79–85.

Recommendations are made as to the varieties most suitable for cultivation in North Dakota. Tests conducted by the Fargo Experiment Station have indicated that Lee, Rushmore and Selkirk are relatively resistant to race 15B of stem rust.

239 Meleškin, A.
(Results of state varietal trials with wheat in the Latvian SSR).
Zemledelie (Agriculture) 1954 : No. 4 : 80–86. [Russian].

The winter wheats Pšenično-Pyreĭnyĭ Gibrid 1 [Wheat-*Agropyron* Hybrid 1] and Pšenično-Pyreĭnyĭ Gibrid 599 have been made standards on the basis of their high yield, hardiness and resistance to lodging. In some districts they gave yields appreciably higher than those of Kursas, the previous Latvian standard. Of the 20 spring wheats tested, Moskovka [Moscow] and Fylgia proved the most productive. Moskovka showed a high degree of resistance to rust.

Proceedings of the Ninth Meeting of the Crops and Soils Wing of the Board of Agriculture and Animal Husbandry in India held at Indore from the 20th to the 25th March 1952 (1954) : Pp. 290.

The above report includes the following papers on breeding for rust resistance in wheat:

240 *Ramakrishnan, T. S. Wheat rust in Madras State.* (*pp. 278–81*).

The necessity of breeding locally adapted rust-resistant varieties suitable for Madras is emphasized and an historical survey of wheat breeding in the state given. Preliminary yield trials have indicated the superiority, among *Triticum vulgare* varieties, of rust-resistant selections from Kenya E14 x Niphad 4, Hofed 1 x Niphad 4 and Mondhya 417–5 x Hofed 1. A number of rust-resistant *T. durum* lines have been selected from crosses between local susceptible varieties and the rust-resistant introduction Gaza. Gabo, Kendee, Charter, Celebration and Yalta, introduced from Australia, have displayed good resistance to rust when grown on the Nilgiris plateau but proved susceptible when grown in low-lying areas. Proposals for accelerating the development of rust-resistant varieties are put forward and include the revision of methods used for the identification of physiological races of rust present in Madras and a more elastic and comprehensive exchange of rust-resistant varieties with foreign countries.

241 *Waheeduddin, S. Review of the work done on the evolution of rust resistant varieties of wheat in Hyderabad State.* (*pp. 281–82*).

Work on the selection of lines resistant to *Puccinia graminis* var. *tritici* at the Government Main Experiment Farm, Himayetsagar, is described. Seven selections from Hofed and Kenya Governor designated H2–1–1, H2–1–2, H5–3–1, H5–3, KG3–3–1, KG3–3–2 and KG3–3, have shown a high degree of resistance to all the physiological races of black stem rust prevalent in Hyderabad.

242 *Chattopadhayay, S. S. Wheat rust situation in west Bengal.* (*pp. 282–85*).

Work at the newly-founded Himachal Pradesh Research Station is outlined. Strain D and NP770, obtained from the Indian Agricultural Research Institute, New Delhi, have shown a high degree of resistance to *P. graminis* and *P. glumarum*, respectively, and selection work is being carried out on them. The local low-yielding variety Gangajali is the only wheat

which possesses a high degree of resistance to rust in low-lying areas; in the mountainous regions of the Darjeeling district, W206–77, W206–88, W245–100, W246–155, W375–100, W375–128, W375–135, W375–186, E560, E572 and NP768 have displayed considerable resistance to both *P. graminis* and *P. triticina*. Ways of combating rust epidemics are suggested, including the compulsory cultivation of resistant varieties, the compiling of a list of approved varieties on the Netherlands model, selection of locally adapted resistant strains and further investigation into alternative host plants of the rust pathogen.

243 *Pal, B. P. & Parthaswarathy, N. Progress of work in India on the evolution of wheat varieties resistant to the rusts.* (*pp. 285–89*).

A survey of the work of the Indian Agricultural Research Institute in breeding for resistance to rust is given, together with particulars of resistant varieties developed in recent years. NP737, 745 and 760 are fairly resistant to brown rust and NP718 to brown and yellow rust, while NP710, 715, 718 and 775 are tolerant of black rust. Investigations have shown that the rust pathogen is incapable of surviving the prolonged summer heat of the plains and that consequently new epidemics start in the hills. With a view to eliminating this source of infection, an attempt has been made to develop new resistant varieties suitable for cultivation in hilly regions and a number of crosses between local and foreign resistant varieties effected at Simla. The F_8 of the double cross [(Democrat x Pb. C518) x Spalding's Prolific] x [NP114 x Kenya C10854], the F_1 of which was backcrossed to Kenya C10854, appears particularly promising and combines a high degree of resistance to all forms of rust.

244 Ponamarčuk, M. K.
(At the USSR agricultural exhibition. In the "Grain" pavilion).
Priroda (Nature), Leningrad 1954 : No. 9 : 47–51. [Russian].

Among the hardy winter wheats on display were Lutescens 230 and the rye-wheat hybrid 46/131. Novoukrainka 84, originating from Krasnodar, was the most outstanding of the rust-resistant varieties. The spring wheat Steklovidnaja 1 (Vitreous 1] gives higher yields than the hard wheat varieties and has a high protein content.

A new high-yielding rye variety with vitreous grain has been obtained at Verhnjačka by vegetative hybridization between the rye Taraščanskaja 4 and the wheat Lutescens 17.

245 Hårdh, J. E.
Kevätvehnän kahutähkäisyydestä sekä sen syistä Suomessa. (**On shrivel heads of spring wheat and its causes in Finland**).
Valt. Maatalousk. Julk. 1953 : No. 140 : Pp. 152.

A detailed account of the occurrence, causes, symptoms and control of the above pathogenic condition of wheat, which is associated chiefly with combined infestation by *Cercosporella herpotrichoides* and *Amblymerus graminum* is given. Data concerning varietal resistance are included, but resistance to *C. herpotrichoides* alone does not appear to be of significance for avoiding shrivel heads.

OATS

246 **Oat variety trials.**
Mon. Rep. Minist. Agric. N. Ire. 1954 : **29** : 140–42.

The results of trials conducted at five centres in County Tyrone in 1953 are presented. Of seven varieties suitable for cultivation on low-lying soils of medium to high fertility, Abed Minor, Steel (Sun II) and Forward gave the highest yields of grain. Ayr Line and Forward produced the most straw and Craig's Afterlea, Abed Minor and Steel proved the most resistant to lodging. Of six varieties tested on high-lying soils of low fertility, Tyrone Tawny A and Utility gave the highest yields of both grain and straw.

247 Avanzi, E.
Contributo al miglioramento di razza dell'avena. (**Contribution towards varietal improvement in oats**).
Ann. Fac. Agr. Pisa 1953 : **14** : 117–25.

Two selections, named respectively Ombrone and Albegna, have been made from the Morella oat of the Grosseto district: both are giving good results in central Italy and are described and illustrated.

248 de Haan, H.
Oat breeding in the Netherlands.
Euphytica, Wageningen 1954 : **3** : 81–88.

An historical survey of oat breeding and the use of foreign varieties in the Netherlands is presented. In 1953, varieties developed in the Netherlands occupied 71% of the acreage under this cereal.

249 Coffman, F. A.
Varietal purity and the prospect ahead.
Agron. J. 1954 : **46** : 432–33.

The frequent appearance of aberrants among

certain recently distributed disease-resistant oat varieties in the United States is ascribed to the fact that those varieties have to a considerable extent been derived from the relatively unstable species *Avena byzantina*. The writer favours readjustments in purity standards as a solution to the problem.

250 **Spring oats trials in West Virginia 1949-1953.**
Circ. W. Va. agric. Exp. Sta. 1954 : No. 93 : Pp. 5.

Data on yield, resistance to disease and quality of straw are presented for 18 varieties tested at Morgantown, Reedsville and Wardensville during 1949–53. Andrew, Bonda, Mindo and Missouri 0–205 gave the highest average yields of grain.

251 Finkner, R. E., Murphy, H. C., Atkins, R. E. & West, D. W.
Varietal reaction and inheritance of fluorescence in oats.
Agron. J. 1954 : **46** : 270–74.

Seed of 141 varieties and selections and of segregating progenies of 23 crosses was classified for fluorescence and nonfluorescence in ultraviolet rays at the Iowa Agricultural Experiment Station. The results suggested that the character of fluorescence may be useful as an additional technique in varietal identification and in detecting varietal mixtures (cf. *PBA*, Vol. XXIV, Absts. 2872 and 2873). The fluorescent reaction depended upon one or two major genes, fluorescence being dominant to nonfluorescence. Apparently Victoria and Ukraine possess a common gene for fluorescence at one locus, and Klein 69B, Santa Fe, Landhafer and Anthony-Bond x Boone a common gene for fluorescence at another locus. Trispernia probably possesses both genes and Clinton neither. The genes for fluorescence were independent of those governing reaction to races 57 and 109 of crown rust.

252 Grafius, J. E. & Brown, H. M.
Lodging resistance in oats.
Agron. J. 1954 : **46** : 414–18.

"Lodging resistance in oats is discussed under three major headings: (1) a description of lodging, (2) the measurement of lodging resistance and (3) experimental procedure and results.

Under part 1, three types of bending of an oat culm are: (A) mainly at the base (so-called root lodging), (B) uniform throughout and (C) mainly at the top (buggy whip type). It is shown that in lodging, the panicle base would generate an ellipse of the form $x^2 = a^2\left(1 - \frac{y^2}{b^2}\right)$, where:

a = length of horizontal axis,
b = height of plant to panicle base,
x and y = cartesian coordinates for the position of the panicle base at a given instant.

Samples from 81 varieties were found to vary between types B and C.

Three definitions are given in part 2. Lodging is defined as: the extent of response to torque caused by external forces. Lodging resistance is defined as: the ratio of the additional torque (over and above the weight of culm, leaves and head) a culm is capable of resisting (T_r) to the torque (T_a) applied by external forces, such as wind and rain.

The third and final definition has to do with stiffness of culm. By definition, stiffness of culm is: the torque required to move the base of the head from y to $y - \epsilon$, where ϵ is relatively small when compared to b and x approaches a. The lodging resistance factor cL_r was found to have good repeatability, $r = 0{\cdot}73^{**}$. It was found to give a highly significant correlation with lodging of $r = 0{\cdot}48^{**}$. The correlation between the cL_r factor at East Lansing and lodging in a plot 90 miles distant was also highly significant, although weaker. Suggestions were made for strengthening these correlation coefficients where necessary. However, even when using only three culms, accurate separation of the extremes in lodging resistance and susceptibility appeared possible."

[Authors' summary].

253 Silva, A. R. da
Raças fisiológicas de *Puccinia coronata avenae* que ocorrem no sul do Brasil. (**Physiological races of *P. coronata avenae* which occur in the south of Brazil**).
Agros, Rio Grande do Sul 1953 : **6** : 64–71.

By using (1) the older set of differential oat varieties proposed by H. C. Murphy and (2) a more recent set proposed by H. C. Murphy and H. A. Rodenhiser, 25 different physiological races have been detected.

254 Williams, W. & Verma, U. N.
Investigations on resistance to disease among species of the genus *Avena*. I. Resistance to physiologic races of *Ustilago avenae* and *U. kolleri*.
Ann. appl. Biol. 1954 : **41** : 405–16.

It is pointed out that most cultivated varieties of oats tend to be derived from a limited range of genetic material, large numbers of species and varieties of the genus *Avena* having been discarded in breeding programmes and many valuable genes for disease resistance conse-

quently lost. The susceptibility of new improved varieties to attack by fresh physiological races of *Ustilago* after a period of from four to five years is partly attributed to this depletion of genetic reserves and it is suggested that a wider range of material be used in breeding programmes. Experiments at King's College, Newcastle upon Tyne, England, in which 53 samples representing species of the genus *Avena* were tested for resistance to infection by *U. avenae* and *U. kolleri*, indicated that a number of strains of *A. strigosa*, and especially of *A. strigosa* var. *strigosa*, were resistant to all of the six races of smut with which they were inoculated.

255 Miles, L. G. & Rosser, D.
Bovah—a new grazing oat for Queensland.
Qd agric. J. 1954 : **78** : 311–15.

Bovah [(Bond x Victoria) x Hajira], recommended as a grazing type for south and central Queensland, is resistant to both crown rust and Victoria blight.

256 Horber, E.
Unterschiede in der Anfälligkeit verschiedener Hafersorten im Jugendstadium gegenüber der ersten Frühlingsgeneration der Fritfliege. (**Differences in the susceptibility of various oat varieties in their early stages towards the first spring generation of the frit fly**).
Mitt. schweiz. Landw. Zürich-Oerlikon 1954 : **2** : 143–48.

Susceptibility to attack by frit fly was found to depend largely upon speed of initial seedling growth. In trials conducted at five centres in Switzerland during 1950–54, Flämingstreue, Soldanelle, Flämingsgold, Svalöf KO1452 and Blenda proved least susceptible to the pest. A certain interaction between variety and environment was observed, for example, Flämingstreue proved the most resistant variety at Oerlikon and Reckenholz but was comparatively susceptible at Katherinental and Frienisberg.

RYE

257 Hagberth, N. O.
Sortvalet vid rågodling i södra och mellersta Sverige. (**The choice of variety in rye growing in southern and central Sweden**).
Weibulls Årsb. 1954 : 10–11.

Comparison of the performance and characteristics of Petkus II and Kungs II [King's II] in trials in various localities in Sweden has shown the more drought-resistant Petkus II to be the best variety for certain districts and soils of southern and central Sweden. Kungs II, with its shorter and stiffer straw, is more easily harvested and is specially suited for western districts.

258 Forsøg med rugsorter 1952–53. (**Trials with rye varieties, 1952-53**).
Tidsskr. Frøavl 1954 : **22** : 44–45.

The yields of grain and straw, tendency to lodging, straw length, hectolitre weight and grain size of seven Danish, Swedish and other varieties of rye, tested on different types of soil at 10 experimental farms in Denmark, are recorded. Sejet Kærnerug [Sejet Kernel rye] was the highest yielding on loamy soil, while a Petkus mixture from the breeding plots was the highest yielder on sandy soil and, like Petkus original certified seed, gave the best quality grain.

259 Winterrogge, 1954. (**Winter rye, 1954**).
Landbouwvoorlichting 11: Bijl. 19; Ber. Rassenkeuze No. 171 : 1954 : unpaginated.

The results of trials of six varieties on different types of soil in the Netherlands are presented. Petkus and Dominant proved highly productive on all soils but were outyielded on alluvial clay by Brandt's Marien. Brief descriptions of all six varieties are given.

260 Ščeglov, Ju. S.
(**An experiment on breeding winter rye**).
Agrobiologija (Agrobiology) 1954 : No. 3 : 106–09. [Russian].

An account of rye breeding in the Moscow and Kostroma provinces is given, together with a description of breeding material under trial. The embryo of the rye Vjatka Moskovskaja [Moscow Vjatka] was grafted on to the endosperm of the wheat Vetvistaja Kahetinskaja [Branching Kahetian] and the resulting hybrid open-pollinated with a rye occurring as a weed in the wheat fields of Nagornyi Karabah, Transcaucasia. Selections from the F_3 of the hybrid resulting from this pollination include forms 155–160 cm. tall with compact ears and large grain and also some plants with branching ears. Crosses between the rye obtained from Nagornyĭ Karabah and a perennial form originating from Azerbaĭdžan have given productive perennial hybrids resistant to rust and mildew. They are hardy and their grain is vitreous; the 1000 grain weight is 35 g. Selection from rye types found growing as weeds in Transcaucasia and Kostroma has resulted in

high-yielding forms with a 1000 grain weight of 40 g.

261 PLARRE, W.
Vergleichende Untersuchungen an diploidem und tetraploidem Roggen (*Secale cereale* L.) unter besonderer Berücksichtigung von Inzuchterscheinungen und Fertilitätsstörungen. [**Comparative investigations of diploid and tetraploid rye (*S. cereale* L.) with special consideration of inbreeding phenomena and disturbances in fertility**].
Z. Pflanzenz. 1954 : **33** : 303–53.

Comparisons of diploid and tetraploid lines of the variety Petkus Normal at the Plant Breeding Institute of the University of Halle-Wittenberg, Germany, showed that the 1000 grain weight of the tetraploids was up to 50% greater than that of the diploids, the inflorescence larger and the leaves longer and broader. The stalks, although thicker than those of the diploids, were 11–15% shorter, as were also the internodes. Tetraploid plants had 10% fewer flowers per ear, were considerably more resistant to shattering and had a protein content of 16·2% compared with 13·3% in the diploids. The $4n$ plants were less fertile than the $2n$, this being attributed to irregular meiosis accompanied by chromosome aberrations in the tetraploid plants. Tetraploid plants were not depressed by inbreeding to the same extent as diploids. A positive correlation between degree of meiotic irregularities and the extent of ear deformity was established, thus enabling selection for comparatively high fertility in $4n$ plants to be undertaken by examining the ears under a magnifying glass.

262 ROD, J. & VRŽEVSKIĬ, F.
(**Breeding value of a winter rye with ears branching as a result of improved nutrient supply**).
Za socialist. seljskohozjaĭstv. Nauk. (For socialist agric. Sci.), Praha 1954 : Ser. A : 111–28. [Russian].

Czechoslovak experiments showed that the branching habit of a form, selected for its branching ear at Brno, depended solely on availability of a large amount of nutrients.

MAIZE

263 AVANZI, E.
Contributo al miglioramento della varietà del granoturco. (**Contribution to the varietal improvement of maize**).
Ann. Fac. Agr. Pisa 1953 : **14** : 127–34.

Two maize selections, Arno and Serchio, are described. Both are suitable for soils of medium fertility in central Italy.

264 GRANER, E. A.
A posição do gen Y_3 no cromossomo 2 do milho. (**The position of the gene Y_3 on chromosome 2 of maize**).
An. Esc. Agric. Queiroz 1953 : **10** : 133–40.

A line containing y_3 was crossed with lines containing lg_1 and lg_2, which are also on chromosome 2; from the results it is shown that Y_3, one of the complementary genes of Y_1 and Y_7 for yellow endosperm, is 7 units from lg_1, which in turn is 18 from lg_2.

265 SCHNELL, W.
Über die Anbaueignung von Maishybriden und -sorten. (**On the suitability for cultivation of maize hybrids and varieties**).
Z. Acker- u. PflBau 1954 : **98** : 1–24.

The results of the FAO trials of American hybrids in Western Germany during 1950–52 are discussed, with special reference to the importance of selecting hybrids in the correct maturity group for cultivation under local conditions. Wisconsin 270, 275A, 355, 341A and 525 are recommended for silage and forage purposes and Wisconsin 240, 255 and 270 for grain.

266 BERTHELEM, P. & COTTE, A.
Essais de variétés de maïs hybrides pour la Bretagne. (**Trials of varieties of hybrid maize for Britanny**).
Progr. agric. vitic. 1954 : **71** : 370–73.

The results of trials conducted at the Plant Breeding Station, Rennes, France, are presented. The American hybrids United 20 and 22, Wisconsin 255 and Warwick 210 gave the highest yields and are suitable for cultivation in Britanny.

267 JUCCI, C.
I mais ibridi trionfo della moderna genetica. (**Hybrid maize, a triumph of modern genetics**).
Ital. agric. 1954 : **91** : 405–14.

An historical account of the production of hybrid corn is presented, special reference being made to the use of male-sterile lines, the use of haploids for producing homozygous diploids, the importance of "gene banks" for conserving the germplasm of locally adapted varieties and the success of hybrid maize in Italy.

268 SOKOLOV, B. P.
(**Interline hybrids of maize**).
Zemledelie (Agriculture) 1954 : No. 4 : 87–94. [Russian].

In maize trials at Sineljnikovo, the F_1 and even

the F_2 and later generations of top crosses and single or double crosses persistently outyielded the standard Dnepropetrovsk and such intervarietal hybrids as Pervenec [First-born]. Material distinguished by high yields in the F_1, such as the top cross Uspeh [Success] and the interline hybrids Dnepropetrovsk 1 and Stepnjak [Steppe], showed the most appreciable decrease in productivity in the F_2, although their yields still compared favourably with the other crosses tested.

269 Vološin, E. S.
(The best high-yielding varieties of maize).
Zemledelie (Agriculture) 1954 : No. 7 : 117–18. [Russian].

In Moldavian trials the new hybrids VIR 25 [Institute of Plant Industry 25] and VIR 42 gave higher yields than Dnepropetrovsk, Mestnaja [Local] and the hybrid Moldavian 1 on all types of soil and under all climatic conditions.

270 Emeljjanov, I. & Zvoskova, N.
(Hybrid seed—an important reserve for increasing the yielding ability of maize).
Kolhoz. Proizvod. (Collect. Fm. Prod.) 1954 : No. 7 : 43–44. [Russian].

Yields of up to 100 and even 200 c. per ha. are reported from collective farms in the USSR where hybrid maize has been grown. The double-cross hybrids of the Institute of Plant Industry have given the highest yields, are the most resistant to diseases and lodging and are more suitable for mechanized harvesting than the intervarietal hybrids, which they have outyielded by 8–12 c. per ha.
Directions are given for producing double-cross seed on the collective farm.

271 Duncan, G.
Hybrid maize, its history, spread, and adaptation to India.
Allahabad Fmr. 1954 : **28** : 1–8.

A general account of hybrid maize in the United States and other countries is followed by an outline of Indian work on testing and breeding hybrids and by comments on the potentialities of this type of maize for India.

272 Veredeling van mais in de Verenigde Staten. **(Maize breeding in the United States).**
Contactgroep Opvoering Productiviteit, s'Gravenhage 1954 : Pp. 58.

This account of a study tour through the USA to investigate problems relating to the cultivation of hybrid maize includes reports on the maize breeding programmes in operation at the Universities of Ohio, Illinois, Iowa, Wisconsin and Connecticut. The author lays special emphasis on the use of male sterility and monoploids and on breeding for resistance to diseases, pests and low temperatures.

273 Huber, L. L.
Pennsylvania corn performance studies—1953.
Progr. Rep. Pa. agric. Exp. Sta. 1954 : No. 119 : Pp. 12.

The results of tests on double hybrids of maize at different centres in Pennsylvania during 1953 are summarized. The practical significance of differences shown by hybrids with respect to water requirements is discussed.

274 McAfee, T. E. & Rogers, J. S.
Corn hybrids for Texas.
Bull. Tex. agric. Exp. Sta. 1954 : No. 776 : Pp. 10.

Data on yield and resistance to disease and lodging are presented for 15 varieties of hybrid maize tested at the Texas Agricultural Experiment Station during the period 1951–53. TRF3 and Texas 26, 28, 30 and 15W gave the best results.

275 Crane, P. L., Remmenga, E. E., Newman, J. E. & Miles, S. R.
Performance of dent corn hybrids in Indiana, 1949-1953.
Sta. Bull. Purdue Univ. agric. Exp. Sta. 1953 : No. 604 : Pp. 62.

Tabulated data on yield, period to maturity, susceptibility to lodging and moisture content are presented for 29 hybrids tested at a number of centres and on different types of soil in Indiana during the above period. The preamble gives information on criteria employed in assessing the value of a given hybrid and makes recommendations as to factors to be considered by the grower in selecting the most suitable hybrid for his particular requirements.

276 **Three new corn hybrids developed for Wisconsin.**
What's New Crops Soils 1954 : **6** : No. 9 : p. 28.

The red dent x yellow dent strains W335A and W435 and the yellow-dent strain W642, recently developed in Wisconsin, are described briefly. W335A matures 90 days after sowing, has long, slender ears and is easy to husk. W435, which has a period of 100 days to maturity, is promising from the point of view of ear production, size and shape. W642 matures 117 days after sowing and has good appearance and baking qualities.

277 Zuber, M. S. & Beard, B. H.
Missouri hybrid corn yield tests for 1953.
Bull. Mo. agric. Exp. Sta. 1954 : No. 613 : Pp. 19.

Tabulated data on yield, moisture content of the grain at harvest, stalk length and percentage of lodged plants are presented for some fifty hybrids tested at nine centres in Missouri. Over the state as a whole, the unreleased hybrid Mo. 843 gave the best results, followed by US13 and Kansas 1639; the latter variety is not, however, recommended for cultivation in southern areas.

278 Bocanegra S., S.
El maíz híbrido en la costa del Perú. (**Hybrid maize in the coastal area of Peru**).
Circ. Estac. exp. agric. La Molina 1953 : No. 67 : Pp. 16. (Mimeographed).

As a result of work started in 1938 a number of inbred lines have been selected for their high combining ability. In 1949 the hybrid La Molina 2, from inbreds of Estrella [Star] and Uhina Amarillo Cuzco, was distributed and later La Molina ♯ 3 was issued; it is a cross of inbreds from Estrella and Santa Clara and has given yields exceeding 6000 kg. per ha. in the Lima province, this being 20% more than the most popular variety in the area, Fumagalli. This hybrid is a yellow flint, the type most popular in the locality, produces two ears per plant and has a strong root system.

279 Constancio Lázaro, R., Alaggia, H. A. & Navarro, G.
Mejoramiento del maíz. (**Maize breeding**).
IV Conf. Interamer. Agric. II Reun. Reg. Latinoamer. Agric. Aliment. 1951 : 274–75.

All double-cross hybrids tested have surpassed the local Uruguayan varieties in yield. A number of inbreds have been made from these local varieties and 26 of them have been selected for further use in the production of hybrids and synthetics based on local material.

280 Kavanagh, L. R.
Maize—1954-55. Sowing recomendations—advantages of hybrid seed.
Agric. Gaz. NSW 1954 : **65** : 234–37.

A list is given indicating the hybrids and open-pollinated varieties suitable for the different districts of New South Wales; brief descriptions of the recommended hybrids are provided.

281 Manner, R.
Ensilagemajs. (**Maize for ensilage**).
Våren 1953. Hammenhögs, Otto J. Olson & Sons AB : 3–8.

The availability of American hybrid maize varieties and recent technical advances in the production and use of silage for live stock suggest that maize can now be profitably grown for fodder in parts of Sweden, where comparative variety trials have shown that strains maturing in 80–90 days give the best yields of green forage. The leafy and luxuriant American hybrid Jacques 907, which outyielded Wisconsin 240 by 1·1% and Northrop King's KS–2 by 22·5%, was bred for the American northern maize belt, where the climate resembles that of southern Sweden; and it is therefore recommended for testing on a large scale in Sweden.

282 Galinat, W. C.
Corn grass: 1. Corn grass as a prototype or a false progenitor of maize.
Amer. Nat. 1954 : **89** : 101–04.

The author suggests that the morphological characteristics of corn grass have their counterparts in the Maydeae as a whole and that this macromutant cannot therefore be regarded as the immediate ancestral type of maize. Studies of hybrids between corn grass and different forms of maize may, however, be of value in identifying relic germplasm characteristic of the primitive grass from which maize and its relatives evolved.

283 Rhoades, M. M.
Chromosomes, mutations, and cytoplasm in maize.
Science 1954 : **120** : 115–20.

This survey of the main results of American work on the cytogenetics of maize is the text of a paper included in the symposium "Species that feed mankind" held by the American Association for the Advancement of Science at Boston, 27 December 1953.

284 Anderson, E. G. & Kramer, H. H.
Translocations in maize involving chromosome 10.
Genetics 1954 : **39** : 506–12.

Data are provided on the linkages of *g* for golden plant colour and *R* for aleurone colour with the interchange points of 18 translocations involving chromosome 10, comparisons being made between the recombination values obtained and the cytologically determined positions of the interchange points. Four translocations appear to involve the short arm and thirteen

are probably on the long arm; in the case of the remaining translocation the genetic findings were inconsistent with the cytological data. The interchange positions on the long arm were correlated with the recombination values for t–*g* and t–*R* by coefficients of −0·71 and −0·85, respectively. No heterogeneity of recombination in the *g*–*R* region was detected for translocations in which the t–*g* recombination value exceeded 2%. The gene *li* (lineate) is situated on the long arm of chromosome 10. The approximate order of the translocation points is indicated.

285 Vidal, A. A.
Actividad diastásica de algunas variedades de maíz influída por diferentes condiciones de malteado. (**Diastatic activity of some maize varieties as influenced by different malting conditions**).
Bol. Soc. arg. Bot. 1951 : **4** : 117–28.

Reference is made to varietal differences in diastatic activity; the sweet maize Early Evergreen had the highest diastatic activity, followed in order of decreasing effect by the white, yellow and deeply pigmented flint varieties under investigation.

286 Teas, H. J.
B vitamins in starchy and sugary maize endosperms.
Plant Physiol. 1954 : **29** : 190–94.

In a microbiological assay of endosperms from segregating ears or closely related lines, the sugary type (*su*) was superior to the starchy type (*Su*) with respect to choline, B_6, riboflavin, inositol, niacin, biotin, pantothenic acid and thiamin contents expressed on a per gramme basis. On a per endosperm basis, the sugary type had higher contents of only the last five. Since radiation-induced *su* mutants were similar to ordinary sugar types in their contents of B vitamins, it is concluded that the differences between sugary and starchy endosperms are due to the pleiotropic effect of the *su* gene itself and not to any closely linked factors.

287 Richey, F. D. & Dawson, R. F.
Thicker aleurone inadequate explanation for higher niacin in sugary maize.
Plant Physiol. 1954 : **29** : 194–96.

The suggestion of Teas (cf. *PBA*, Vol. XXIII, Abst. 1168) that the higher niacin content in sugary than in starchy kernels is due to a thicker aleurone layer is criticized; his data are interpreted as showing that every kernel part in the sugary type has more niacin on both a per gramme and per part basis. The higher niacin content of *su* kernels is attributed by the authors to the pleiotropic interaction of *su* with a multiple factor system for niacin content (cf. *PBA*, Vol. XXII, Abst. 352).

288 Ščelokova, Z. I.
(**Investigation of some fertilization problems in maize**).
Ž. obšč. Biol. (J. gen. Biol.), Moscow 1954 : **15** : 109–14. [Russian].

In experiments at Harjkov, the white-seeded variety Kostyčevskaja showed a selective preference for self pollen as against the pollen of the yellow-seeded varieties Voronež 76, Dnepropetrovsk and Harjkov 23. Other white-seeded varieties, such as Harjkovskaja Belaja Zubovidnaja [Harjkov White Dent] and Sterling, had a selective preference for the pollen of Voronež 76 and Dnepropetrovsk as against self pollen. In most crosses the percentage of hybrid seed was increased by fertilization with self pollen five hours before fertilization with foreign pollen or by pollination with the pollen of two or three varieties together with self pollen. In the case of Kostyčevskaja, most hybrid seed was obtained when the maternal parents were grown on rich soil. When the varieties Kostyčevskaja and Harjkovskaja Belaja Zubovidnaja were fertilized with different proportions of self and foreign pollen it was noted that the percentage of hybrid seed produced by Kostyčevskaja fell as the proportion of self pollen in the mixture increased, whereas in the case of Harjkovskaja Belaja Zubovidnaja, the percentage of hybrid seed was always high, even when the mixture comprised 99% self pollen.

289 Rod, J. & Segetjeva, V.
(**Question of determining the capacity of pollen and stigmas for fertilization in relation to the age of inflorescences of a plant**).
Za socialist. seljskohozjaïstv. Nauk. (For socialist agric. Sci.), Praha 1954 : Ser. A : 128–46. [Russian].

Experiments with maize at Brno suggest that pollen viability and receptivity of the stigmas depend on variety, district of cultivation and the age of male inflorescences and stigmas. The optimal time for pollinating the stigmas was 4–8 days after earing; the pollen had good viability 2–3 days after flowering. Physiological deterioration of the stigmas occurred 20 days after earing and of the male inflorescences 12 days after flowering.

290 Andrew, R. H.
Breeding maize for cold resistance.
Euphytica, Wageningen 1954 : **3** : 108–16.

A review of investigations on testing and breeding maize for cold resistance in the germination and seedling stages at the University of Wisconsin is given. A "walk-in" type of refrigerator is now being used for germination tests in soil. Pathogenic and other non-genetic factors influencing stands obtained from seed germinated at low temperatures are examined. The role of genotype in determining cold tolerance is briefly described. Differences in the behaviour of reciprocal hybrids are attributed to differences in the pericarp and endosperm; cold-tolerant inbreds should be used as seed parents. The possible association between growth rate of the embryo and seedling reaction to disease, and some technical problems in testing are also discussed.

291 Ibrahim, M. A.
Association tests between chromosomal interchanges in maize and resistance to the European corn borer.
Agron. J. 1954 : **46** : 293–98.

In order to determine which chromosomes carry the genes differentiating the corn-borer resistant inbred A411 and susceptible inbred A344, the following general procedure was adopted in experiments carried out at the University of Minnesota. Susceptible interchange lines were crossed with A411, whose borer resistance is dominant. Semisterile F_1 plants, i.e. the interchange heterozygotes, were back-crossed to A344; the individual plants of the segregating progenies were then classified for semisterility *vs.* normal pollen production and for borer reaction. The data indicated conclusively that the resistance of A411 is due to at least one gene in the long arm of chromosome 3 and one gene in the long arm of chromosome 4. Probably another gene for resistance is located in the long arm of 5; the further possibility of a factor in the long arm of 7 was not ruled out. No conclusive evidence was obtained of any association between the factors for corn-borer reaction in resistant or intermediate interchange lines and the interchange each carried. At least some of the genes for resistance in two of the resistant interchange lines were different from those conferring borer resistance upon A411. These lines may be useful as sources of resistance, in addition to A411.

292 Mohamed, A. H.
Association tests between chromosomal interchanges in maize and tender pericarp in sweet corn.
Diss. Abstr. 1954 : **14** : Publ. No. 8129 : 902–03. (Abst.).

In order to locate the factors differentiating tender from tough pericarp, the sweet corn inbred S4 was crossed with interchange lines possessing rough pericarp, and the semisterile progenies were back-crossed to S4 and to the dent corn inbred Wis. 23. F_1 behaviour indicated that (1) tough pericarp was incompletely dominant over soft, (2) dominance of early date of silking over late was practically complete, (3) early pollen shedding was partially dominant over late and (4) presence of tillers was dominant over absence. The association data from the two series of back crosses provided evidence of several genes for each of the characters pericarp tenderness, date of pollen shedding, date of silking and tillering; the chromosome arms in which these were situated were determined in the majority of cases.

BARLEY

293 Wilten, W.
Opbrengsten, rassenstatistiek en raseigenschappen van zomergerst. (**Yields, variety statistics and varietal characteristics of spring barley**).
18de Nacobrouw Jb. 1954 : 114–27.

Tabulated data on the yields, maturity, length and stiffness of straw, size and quality of grain, resistance to diseases and adaptability to different types of soil are presented for the principal varieties cultivated in the Netherlands.

294 Mansholt, R. J.
Enige ervaringen bij de veredeling van zomergerst. (**Some experiences in the breeding of summer barley**).
18de Nacobrouw Jb. 1954 : 66–71.

An account of barley cultivation in the Netherlands since 1928 is given; at present the most widely grown variety is Balder. It is suggested that Netherlands breeders concentrate on developing a good malting variety adapted to the Zeeland district. Aims should include high yield, resistance to disease, and stiff straw.

295 Wilten, W. & Kortenhorst, A. T.
De veldproeven in 1953. (**The field trials in 1953**).
18de Nacobrouw Jb. 1954 : 103–13.

The results of trials of spring barleys conducted at several centres in the Netherlands are given.

Frisia, Herta, Balder, Piroline and Agio gave the highest yields.

296 Wintergerst, 1954. (**Winter barley, 1954**).
Landbouwvoorlichting **11** : Bijl. 18; Ber. Rassenkeuze No. 170 : 1954 : unpaginated.

Data on the relative yields on different soils of the six chief varieties cultivated in the Netherlands are tabulated and short descriptions of each variety given.

297 Buchli, M.
Anbauversuche mit Wintergerstensorten, 1951–1954. (**Cultural trials of varieties of winter barley, 1951-54**).
Mitt. schweiz. Landw. Zürich-Oerlikon 1954 : **2** : 156–64.

Data on time to maturity, resistance to disease, yield, pedigree and quality of grain and straw are presented for six varieties of winter barley tested at the Federal Agricultural Research Institute, Zürich-Oerlikon, Switzerland, from 1951 to 1954. Dea and Riniker produced the highest yields of grain and Urania the most straw. Dea and Bordia were the varieties most resistant to lodging. Riniker proved to be most resistant to *Ustilago hordei* and Riniker and Bordia to snow mould.

298 Jensen, N. F.
Hudson. A hardier winter barley for New York.
Fm. Res. 1954 : **20** : No. 3 : 14–15.

The six-rowed bearded barley Hudson (Michigan Winter x Wong), developed by the Cornell University Agricultural Experiment Station in cooperation with the US Department of Agriculture, is superior to Wong in yield, winter hardiness, bushel weight and scald resistance and equal to it in stiffness of straw.

299 Webster, O. J.
Barley in Nebraska.
Bull. Neb. agric. Exp. Sta. 1954 : No. 423 : Pp. 35.

Spring and winter barley breeding and testing carried out by the Nebraska Agricultural Experiment Station during the period 1941–1953 are surveyed. Descriptions of recommended varieties are provided.

300 Sagromsky, H.
Zur Bedeutung der Gerstengranne für die Kornentwicklung. (**On the importance of the awn in barley for the development of the grain**).
Z. Pflanzenz. 1954 : **33** : 267–84.

Experiments at the Institute for Research on Crop Plants, Gatersleben, Germany, showed that the awn played an important role in photosynthesis and in the development of the grain. Removal or curtailing of the awn at time of flowering led to a marked decrease in number of mature grains and in size of grain; long-awned barleys suffered more in this respect than short-awned varieties. The importance to the breeder of not removing the awn when effecting artificial pollination is stressed.

301 Bahteev, F. H.
(**Biology and morphology of *Hordeum* L. species**).
Bot. Ž. (Bot. J.), Moskva 1954 : **39** : 112–18. [Russian].

Brief notes on the biological and morphological characteristics of the wild species *H. bulbosum, H. jubatum, H. nodosum, H. crinithum* and *H. violaceum* are presented on the basis of observations made at Nemčinovka.

302 Aastveit, K.
Beskrivelse og klassifisering av 24 byggsorter. (**Description and classification of 24 varieties of barley**).
Forskn. Fors. Landbr. 1954 : **5** : 249–92.

The taxonomic characteristics used in classifying 24 varieties of barley grown in Norway are set out. The botanical descriptions, based largely on observations during 1951–53 in field trials of barley at the Vollebekk Experimental Farm of the Agricultural College of Norway, are accompanied by particulars of the genetic origin and agronomic features of the varieties.

303 Andrews, J. E.
Inheritance of reaction to loose smut and to stem rust in barley.
Diss. Abstr. 1954 : **14** : Publ. No. 8109 · p. 899. (Abst.).

Inheritance of reaction to two collections of *Ustilago nuda*, designated Vr and Vs, respectively, was studied in crosses involving the barleys Anoidium, Valentine and Montcalm. The resistance of Valentine to Vr was controlled by a single dominant gene (*Un*). The resistance of Anoidium to Vr depended upon a single recessive factor (*un7*). Under greenhouse conditions, the data indicated that the resistance of Anoidium to Vs was controlled by a single dominant gene; under field conditions the distribution of infection classes was skewed further towards susceptibility than expected on the basis of this mode of inheritance, possibly as the result of selective mortality against resistant genotypes.
Investigations were carried out on the inheritance of reaction to race 56 of stem rust in the field and to race 15B at 80–85° F and 65–70° F

in the greenhouse. The resistance of Valentine to race 56 depended upon a dominant gene which also apparently governed seedling reaction to race 15B at the higher temperature. Only the temperature of 80–85° F was satisfactory for differentiating resistant and susceptible material in the greenhouse. The factors for resistance to stem rust and to Vr in Valentine were linked with a recombination value of 9·19 ± 1·78%.

304 Hiratsuka, N. & Sato, S.
[Studies on the rust resistance of cereals. III. Studies on the resistance of *Hordeum*, *Triticum* and related plants to leaf rust of barley (*Puccinia Hordei*)].
Ikushugaku Zasshi/Jap. J. Breeding 1953 : **3** : No. 2 : 59–64. [Japanese].
Numerous botanical varieties of *Hordeum* and *Triticum* spp. and representatives of *Aegilops, Agropyron, Elymus, Haynaldia, Lolium, Avena, Triticum* x *Aegilops* and *Triticum* x *Agropyron* were tested for susceptibility to the above pathogen. The resistant barley species were *H. murinum, H. nodosum, H. pusillum, H. gussoneanum* and *H. jubatum*; all the representatives of the other genera were resistant.

MILLETS AND SORGHUMS

305 Dahms, R. G. & Sieglinger, J. B.
Reaction of sorghum varieties to the chinch bug.
J. econ. Ent. 1954 : **47** : 536–37.
The results of tests of the reactions of 28 grain sorghums and 9 forage types to chinch bug at two centres in Oklahoma in 1946 and 1949 are reported. Several entries exhibited resistance; Kaferita CI811 had the lowest percentage of plants killed in both localities.

RICE

306 Reynolds, E. B.
Research on rice production in Texas.
Bull. Tex. agric. Exp. Sta. 1954 : No. 775 : Pp. 29.
This account of rice cultivation in Texas includes the results of trials of 19 varieties conducted by the Rice-Pasture Experiment Station, Beaumont, from 1948 to 1953. Bluebonnet, Bluebonnet 50, Improved Bluebonnet, Century Patna, Texas Patna and TP49 are recommended as being the varieties most suitable for cultivation in the state.

307 Cada, E.
A comparative study of the agronomic merits and milling characteristics of different upland rice varieties.
Philipp. J. Agric. 1952 (1954) : **17** : 23–54.
The results of a study of 20 varieties grown at the Pangasin Provincial Nursery, Philippines, are reported.

308 Syakudo [Shakudo], K. & Kawase, T.
[Studies on quantitative inheritance. XI. A. Rice (d) Studies on the inheritance of and quantitative function of the genes determining heading period. (1) On the quantitative function E_1, E_2 and the gene D_1 responsible for dwarf habit].
Ikushugaku Zasshi/Jap. J. Breeding 1953 : **3** : No. 2 : 6–12. [Japanese].
Further to their studies on the genetics of quantitative characters in the cross Nabeshima x an improved strain of Daikoku (cf. *PBA*, Vol. XXIV, Abst. 1129), the authors analyse the effects of the above three genes on heading period. This character is affected by all three genes, the alleles E_1, E_2 and d_1 lengthening heading period as compared to e_1, e_2 and D_1, whose effect is the reverse. E_1 is believed to be fully dominant and E_2 imperfectly. The effects of all three gene pairs are cumulative but their precise form of interaction appears to be complex. E_1 appears to be identical with H_2, controlling culm height.

309 Oka, H.
(Variation in a number of characters and combinations of characters among rice varieties. I. Phylogenetic differentiation of cultivated rice).
Ikushugaku Zasshi/Jap. J. Breeding 1953 : **3** : No. 2 : 33–43. [Japanese].
A comparative study was made of the characteristics of some 120 rice varieties originating from China, Indochina, Siam, India, Japan and the East Indies. The characters investigated were phenol reaction, resistance to $KClO_3$, low temperature and drought, germination rate, period between heading and consolidation of the endosperm, degree of shedding, length of awn and of apicular hair, reaction of the endosperm to alkali, length/width ratio of the unhulled grain, and length of the first and second internodes. A general correlation was discovered between positive phenol reaction, poor resistance to $KClO_3$ and low temperature,

high resistance to drought and absence of awn. The varieties manifesting this combination of characters came mostly from the Asiatic mainland and are designated Continental forms. The converse combination was characteristic of varieties from the East Indies, Japan and northern China; these are designated Insular forms. Within the Insular group, two intergrading categories could be differentiated: a Tropical group and a Temperate group. These two categories differed most particularly in the reaction of the endosperm to alkali.

310 SIREGAR, H.
Further experiments on the treatment of rice with colchicine.
Pemb. Balai Besar Penj. Pert. Bogor 1954 : No. 138 : Pp. 16; also Landbouw, Bogor 1953 : **25** : 291–304.

Investigations were carried out on progenies derived from the colchicine-treated *indica* types Lati sail and Bengawan and the *japonica* type Brondol putih 277 (cf. *PBA*, Vol. XXII, Abst. 1946). Variants evidently due to the reassortment of genes as the result of induced structural changes of the chromosomes appeared in the progenies, in addition to tetraploids. Such undesirable characters as reduced number of spikelets, poor exsertion of the panicles and inferior quality of the grain counteracted the useful characters of the tetraploids, e.g. stiffer straw, greater resistance to lodging and heavier grains; it is concluded that selection of $4n$ progenies does not offer a promising method of improvement. The F_2 of crosses between the $4n$ types of Brondol putih 277 and Bengawan was much more fertile than the $4n$ parents but it did not attain the normal degree of fertility.

311 CHANDRARATNA, M. F.
Photoperiod response in rice (*Oryza sativa* L.). I. Effects on inflorescence initiation and emergence.
New Phytol. 1954 : **53** : 397–405.

Eight Far Eastern varieties were compared in respect of the relation between photoperiod and heading period. The response within the photoperiodic range 8–14 hr. could be expressed as a second-degree curve, sensitivity being best represented as the secondary differential coefficient $d^2y/dx^2 = 2c$. The varieties showed marked differences in sensitivity, ranging from 1·1 in the Ceylonese variety Heenati to 42·9 in the Indian strain Ptb–16.

312 SAMPATH, S. & MOHANTY, H. K.
Cytology of semisterile rice hybrids.
Curr. Sci. 1954 : **23** : 182–83.

Abnormalities observed at anaphase I in hybrids between *japonica* and *indica* types consisted of laggards, stretched chromosomes and bridges with fragments. The occurrence of anaphase bridges is ascribed to inversions in the *japonica* parents. A study of two *japonica-indica* crosses and their reciprocals indicated that the cytoplasm transmitted by the female affected pollen development in the F_1.

313 KONDO, G. & FUKUNAGA, M.
(On varietal differences in the resistance of rice to *Pseudomonas oryzae*).
Ikushugaku Zasshi/Jap. J. Breeding 1953 : **3** : No. 2 : 29–32. [Japanese].

No completely resistant forms were discovered out of the 142 varieties tested. Slight differences in the degree of susceptibility were, however, noted, and lists of varieties arranged according to degree of resistance are given.

FORAGE GRASSES

314 GIÖBEL, G.
Möjligheterna till beteskulturens fortsatta utveckling och främjande. Svenska och utländska erfarenheter. (**The possibilities of the further development and promotion of grassland cultivation. Swedish and foreign experience**).
LantbrVeckan 1954 : 168–82.

Addressing the Swedish Grassland and Bogland Association on the above subject, the speaker referred to the increasing importance of breeding suitable varieties and strains of herbage plants for the diverse climatic zones of Sweden. Hardiness, leafiness, palatability, good recovery after grazing, disease resistance and vigorous aftergrowth should be the breeder's aims. The difficulties of home seed production of the very leafy types that produce relatively few fertile shoots must also be solved.

315 MAYER, R.
La Conférence européenne des herbages de 1954. (**The European Grasslands Conference, 1954**).
Bull. tech. Ing. Serv. agric. 1954 : No. 91 : 349–55.

A brief summary of papers read at the above conference in Paris on 21–24 June 1954 is given. Among items of interest to the breeder were the use of *Triticum-Agropyron* amphidiploids as forage plants, the value of inbreeding in selecting superior strains of forage plants and the production of tetraploid strains of red clover and ryegrass. In the discussion that followed, emphasis was laid on the importance of careful selection of diploid lines prior to colchicine

treatment to induce tetraploidy. Pedigree selection, although slower than mass selection, was stated to give better results.

316 GRUN, P.
Cytogenetic studies of *Poa*. I. Chromosome numbers and morphology of interspecific hybrids.
Amer. J. Bot. 1954 : **41** : 671–78.

The chromosome numbers and morphological characteristics of some *Poa* species and interspecific F_1 hybrids were determined in investigations at Pennsylvania State University. The following species were used: *P. ampla, P. arida, P. compressa, P. pratensis* and *P. scabrella*. Most of the hybrids could be classified on the "diploid" or "triploid" levels, according to whether fertilization of unreduced apomictic or reduced sexual eggs occurred. Although the ♀ parents were in all cases highly apomictic, the majority of the hybrids arose as the result of the fertilization of reduced eggs. The ratio of $2n : 3n$ hybrids produced by a particular ♀ parent varied according to the pollen parent. The small variation in chromosome number at the so-called diploid and triploid levels reflected variation in the number of chromosomes contributed by the gametes, as the result of meiotic irregularities. The morphological characteristics of any one hybrid depended upon the racial features of representatives of the parental species and upon the chromosome numbers of the parental gametes.

317 CHOPINET, R. & DUJARDIN, J.
Étude de quelques populations naturelles de *Dactylis glomerata* L. en vue de leur utilisation agronomique. (**Study of some natural populations of *D. glomerata* L. with a view to their agronomic utilization**).
Ann. Inst. nat. Rech. agron., Paris 1953 : **3** : Sér. B : 453–77.

The geographical distribution of *D. glomerata* in France is discussed and differences in morphological characters, earliness, vigour and resistance to rust and frost between populations from different parts of the country are noted (cf. *PBA*, Vol. XXIV, Abst. 3032).

318 LEFFEL, R. C., KALTON, R. R. & WASSOM, C. E.
Fertility evaluations and their relationships to clonal performance and combining ability in orchardgrass, *Dactylis glomerata* L.
Agron. J. 1954 : **46** : 370–74.

In investigations on 19 noninbred clones at the Iowa State College, the number of germinable seeds per 100 florets, number of germinable seeds per panicle, number of plump seeds per panicle, weight of seed per panicle and weight of unthreshed panicles were found to be satisfactory criteria of self fertility, and also of cross fertility under conditions of open pollination. The clones exhibited a wide range in degree of self fertility. The association between the amounts of seed produced in different years was considerably higher for selfed than for open-pollinated panicles; selfed seed set was not correlated with open-pollinated seed set in a single year. All correlations between self or cross fertility and the performance of single-cross, polycross and top-cross progenies were low in predictive value.

319 MANNER, R.
Engelskt rajgräs Delta. Ny odlingsvärd originalstam. (**The perennial ryegrass Delta. A new original strain worth growing**).
Våren 1954 : Hammenhögs, Otto J. Olson & Sons AB : 9–12.

Derived by selection from a single plant of the variety Viktoria [Victoria], Delta equals it in earliness and has surpassed it so far in yield trials at Gullåker. Its high yield recommends it as a combined pasture and meadow-ley grass, while its attractive appearance and relatively fast spring growth make it suitable for lawns or for sports grounds.

320 COOPER, J. P.
Studies on growth and development in *Lolium*. IV. Genetic control of heading responses in local populations.
J. Ecol. 1954 : **42** : 521–56.

Both competence of the shoot apex to respond to photoperiod and the subsequent response of the head to photoperiod were polygenically inherited in the outbreeding species *L. rigidum, L. italicum* and *L. perenne*; this mode of inheritance makes possible continuous variation in both these components of inflorescence development and thus close adaptation to local environment. Parent plants from all outbreeding populations were heterozygous for genes controlling heading responses. Both competence and response to photoperiod behaved as threshold characters; probably each genotype has a critical photoperiod or critical low temperature without which heading does not occur. No invariable linkage could be detected between the marker gene pairs *Cc* and *Rr* for anthocyanin production and genes controlling competence

or photoperiodic response. The genetic variability exposed within populations by experimental photoperiodic and temperature conditions was evidently controlled by the breeding system. In the outbreeding species *L. rigidum* and *L. perenne*, considerable genetic variation in heading responses was carried within apparently uniform populations, as the result of differences between individuals and heterozygosity within individual plants. No such differences were found within single lines of the inbreeding species studied, viz. *L. temulentum* and three *Triticum* species, although genetic differences existed between apparently uniform lines of the same population. The genetic variability exposed by altered environment is available for future response to selection. In *L. rigidum*, selection for rapid or slow attainment of competence under conditions of altered temperature did not affect photoperiodic response; thus selection in one environment does not necessarily lead to divergence in another. The occurrence of a uniform phenotype stabilized by selection but based on different balanced genotypes is apparently the general rule for most characters of adaptive importance in *Lolium* and other genera, whether in outbreeding or inbreeding populations; any single-gene difference conditioning flowering responses is usually modified by a polygenic background.

321 Piotrowicz, M.
Badania cytologiczne i anatomiczne nad żyworodnymi formami z grupy *Festuca ovina* L. (**Cytological and anatomical investigations on viviparous forms of the group *F. ovina* L.**).
Acta Soc. Bot. Polon. 1954 : **23** : 43–58.

The object of this research was to identify caryological types of *F. ovina* var. *vivipara* and to discover any possible connexion between caryological type and anatomical structure, with the ultimate aim of clarifying the systematic status of *F. ovina* var. *vivipara*. The material came from numerous stations in the Tatras and from two on Babia Góra, the highest peak in the Beskids.

The somatic chromosome number was determined in the growing points of the roots. Two caryological types were found: a tetraploid ($2n = 28$) occurring on Babia Góra, in the High Tatras and also less frequently in the Western Tatras; and a pentaploid ($2n = 35$) which was found only in the High Tatras.

Considerable differences in morphological and anatomical structure were observed in the leaves of both tetraploid and pentaploid biotypes and were proved not to be due to the various habitats; these differences could not be correlated with any definite caryological type.

Anatomical study of specimens from Scandinavia and Greenland showed that biotypes occurred which corresponded in leaf structure to certain types found in the Tatras. The proper systematic classification of *F. ovina* var. *vivipara*, still an unsolved problem, is discussed in the light of the results of these and earlier investigations.

322 Thurman, R. L. and Nester, R. P.
Results of three sorgo trials conducted in Arkansas in 1953.
Agron. J. 1954 : **46** : 431–32.

Five sorghum varieties developed for forage and syrup production were tested for their suitability for silage. Significant varietal differences in green weight per acre, percentage of stalks, total solids content, dry-weight yield per acre and dry-weight percentage were found. Green weight and percentage of stalks showed a highly significant and positive correlation. Total solids content was closely associated with green weight, dry-weight yield and percentage of stalks. High percentage of protein was associated with low green weight and low percentage of stalks. Differences among varieties in dry-weight percentage suggested that differences would occur in the feeding value of the silage.

323 Drolsom, P. N.
Inheritance of leaf blight reaction in Sudan grass.
Agron. J. 1954 : **46** : 329–32.

Data from resistant x resistant and susceptible x resistant crosses suggested that several factors govern the reaction of Sudan grass to leaf blight (*Helminthosporium turcicum*). The first group of crosses consisted of 253 x Piper and 262 x Piper; 1431 x Piper and crosses of 1431 and 1477 with Tift constituted the second group. Resistance was apparently dominant. Seasonal variations in environmental conditions and the probable occurrence of strains of *H. turcicum* differing in pathogenicity complicated the genetical analysis.

324 Fisher, W. D., Bashaw, E. C. & Holt, E. C.
Evidence for apomixis in *Pennisetum ciliare* and *Cenchrus setigerus*.
Agron. J. 1954 : **46** : 401–04.

Chromosome numbers of $2n = 32$, 36, 40 and 54 were found in *P. ciliare*; *C. setigerus* had $2n = 36$. The 36-chromosome types of both species

exhibited regular meiosis; in the other chromosome types of *P. ciliare* laggards were frequently observed at anaphase I. It is suggested that the basic chromosome number of the representatives of both genera is $x = 9$. The morphological constancy of each biotype and of its immediate progeny, the normal seed set obtained from all chromosome types when bagged, the identical appearance of the female parent and its progeny, the occurrence of aneuploid biotypes of *P. ciliare* and the development of multiple embryo sacs of nucellar origin suggest that the two species are apomicts.

325 Paunero, E.
Las especies españolas del género *Anthoxanthum* L. (**The Spanish species of the genus *Anthoxanthum* L.**).
An. Jard. bot. Madr. 1954 : **1** : 401–42.

After a study of a larger number of specimens than has been done by previous authors on the subject some revisions have been made in the classification of the Spanish species of the genus. These are presented, together with a diagnostic key and diagrams and photographs. No grounds were found for including *A. aristatum* as a subspecies of *A. ovatum* and if they are not to remain as separate species both should be subordinated as subspecies of *A. odoratum*.

326 Cugnac, A. de & Simonet, M.
Étude cytogénétique de quelques hybrides intergénériques d'*Agropyrum*: *Agroelymus*, *Agrohordeum* et *Agrotriticum*. (**Cytogenetic study of some intergeneric hybrids of *Agropyron*: *Agroelymus*, *Agrohordeum* and *Agrotriticum***).
Ann. Inst. nat. Rech. agron., Paris 1953 : **3** : Sér. B : 433–52.

An account of artificial intergeneric hybrids raised at the Central Station for Genetics and Plant Breeding of the School of Sciences, Paris, is given. The cross *Elymus canadensis* var. *glaucifolius* ($2n = 28$) x *A. caninum* ($2n = 28$) gave *Agroelymus piettei* ($2n = 28$), which proved the most regular in meiosis of all the hybrids studied. It resembles the *Agropyron* parent and, although sterile, has been propagated vegetatively. Crosses of *Triticum dicoccum* and *T. dicoccoides* with *A. elongatum* ($2n = 70$) gave hybrids with $2n = 49$. Numerous univalents and multivalents were observed in meiosis; the morphological characters of the *Agropyron* parent proved dominant. *A. elongatum* x *T. vulgare* gave hybrids with $2n = 56$. A large number of univalents, a few multivalents and numerous lagging chromosomes were observed. The hybrid proved partially fertile and F_2 and F_3 generations have been obtained. The hybrid ($2n = 28$) from *Hordeum secalinum* ($2n = 28$) x *A. caninum* proved sterile as a result of aberrant chromosomal behaviour.

327 Stebbins, G. L. & Vaarama, A.
Artificial and natural hybrids in the Gramineae, tribe Hordeae. VII. Hybrids and allopolyploids between *Elymus glaucus* and *Sitanion* spp.
Genetics 1954 : **39** : 378–95.

Thirty-five intergeneric crosses involving nine strains of *E. glaucus*, six of *S. jubatum* and two of *S. hystrix* were attempted. The degree of crossability varied considerably according to the particular combination; 13 of the crosses failed completely. Strains of both *E. glaucus* and *Sitanion* differed in their general ability to form intergeneric hybrids. Morphologically, the highly sterile F_1 hybrids were intermediate between their parents, resembling the natural hybrids classified as *S. hanseni*. In the three hybrids examined, meiosis was almost regular. C_2 allopolyploids showed little segregation for morphological characters but segregated widely for degree of pollen and seed fertility; pollen fertility and seed fertility were not correlated within any one progeny. Meiosis in the allopolyploids was more irregular than in the corresponding F_1 hybrids, 1–7 multivalents being formed; pollen abortion was not related to multivalent or univalent frequency but tended to be associated with the frequency of lagging chromosomes at anaphases I and II and with the presence of extra nuclei in the tetrads. It is suggested that the allopolyploids may be autopolyploid with respect to four of their eight genomes ($A_2A_2A_2A_2$) and segmentally allopolyploid for the other four ($E_1E_1E_8E_8$), the formulae $A_2A_2E_1E_1$ and $A_2A_2E_8E_8$ being postulated for *E. glaucus* and *Sitanion*, respectively. Reasons are given for ascribing the sterility of the F_1 hybrids to cryptic structural hybridity; in some combinations probably genic sterility also occurred.

LEGUMINOUS FORAGE PLANTS

328 Wilsie, C. P.
Relative efficiency of lattice and randomized block designs for forage crop trials.
Agron. J. 1954 : **46** : 355–57.

Analyses of 28 lattice designs applied to lucerne, red clover and brome trials showed average gains in efficiency over randomized block analysis of 64%, 39% and 45%, respectively. Four replicates with a lattice design give the same order of precision as six replicates in

randomized blocks. The relative efficiency of lattice lay-outs is greatest when the replicates are long and narrow.

329 GRAUMANN, H. O.
Report of the Uniform Alfalfa Nurseries.
US Dep. Agric., Agric. Res. Serv., Field Crops Res. Branch Beltsville, Md. 1953 : Pp. 107.

Data are given on the performance of lucerne varieties and strains, including synthetics, tested in the United States and at two centres in Canada.

330 **Here : a resistant alfalfa.**
Agric. Res., Wash. 1954 : **3** : No. 3 : p. 16.

Lahontan, a new variety developed by the US Department of Agriculture, is described as being practically immune to stem nematode and highly resistant to bacterial wilt. It is suitable for cultivation in California and Nevada but not in the eastern states.

331 ARMSTRONG, J. M.
Cytological studies in alfalfa polyploids.
Canad. J. Bot. 1954 : **32** : 531–42.

Cytological investigations on tetraploid forms of *Medicago sativa* ($2n = 32$), colchicine-induced octoploids of this species, hexaploids from crosses between $4n$ and $8n$ plants, and tetraploids from the cross *M. falcata* $2n$ x *M. sativa* $4n$ have indicated that genomes A and B are only partially homologous. It is suggested that tetraploid members of the genus have evolved by hybridization among a series of diploid species fairly similar cytologically but differing in well-marked morphological characters, followed by chromosome doubling. Characters common to both parent species would be tetrasomic, divergent characters disomic; a quantitative mode of inheritance may be responsible for the relatively infrequent occurrence of demonstrably tetrasomic characters. Occasional diploid forms of certain tetraploid species probably also arose through interspecific hybridization. In the present study, $2n$ types of *M. sativa* and *M. falcata* and their F_1 hybrids exhibited normal meiosis. It is suggested that comparison of induced chromosome-doubled forms of diploids with existing tetraploids offers a useful line of approach to evolution within the genus.

332 HEINRICHS, D. H.
Developing creeping-rooted alfalfa for pasture.
Canad. J. agric. Sci. 1954 : **34** : 269–80.

Breeding to develop hardy, creeping-rooted lines at the Dominion Experimental Station, Swift Current, Saskatchewan, is surveyed. The types produced have horizontal roots 6–8 inches underground and their rapid spreading does not depend upon moist surface-soil conditions. Individual plants were chosen for their creeping root from crosses of selections of *Medicago falcata* with selections of Ladak and Rhizoma (*M. sativa*). By crossing each particular plant on 6–10 unrelated plants and testing the progenies, estimation of general and specific combining ability for the character of creeping roots was accomplished. Apparently this character is quantitatively inherited, with hidden factors from *M. sativa* complementing the main factors in *M. falcata*. The progenies showed no correlation between high yield of seed and noncreeping habit; winter-killing and creeping roots were negatively associated. Synthetic creeping-rooted strains are now under extensive test in Canada.

333 DENT, J. W. & ZALESKI, A.
Leafiness and chemical composition of some lucerne strains.
J. Brit. Grassl. Soc. 1954 : **9** : 131–40.

Investigations were carried out in 1952 and 1953 on single-spaced plants of several strains at the National Institute of Agricultural Botany, Cambridge, England. On a green-weight basis, the later-flowering lucernes had a higher leaf/stem ratio than the early strains. The early strains contained a higher proportion of dry matter in the leaf and a lower proportion of dry matter in the stem than the later varieties; the lower leaf/stem ratio of the early strains was in this way largely counterbalanced; calculated on a dry-matter basis, the leaf/stem ratio was fairly similar in all strains. It is emphasized that in assessing the leafiness of different strains the leaf/stem ratio calculated on a dry-matter basis should be employed. No outstanding interstrain differences in chemical composition were detected, but in general later-maturing types tended to have a higher percentage of fibre and lower content of nitrogen-free extractives than earlier strains.

334 LESINS, K.
Susceptibilty of some diploid alfalfas to bacterial wilt.
Agron. J. 1954 : **46** : 251–52.

Tests were carried out at Edmonton, Alba., on the bacterial wilt reaction of four strains of *Medicago sativa* and three strains of *M. falcata* from different parts of the world and of a Transcaucasian form of *M. hemicycla*. The tops and roots of *M. falcata* from the north west

Caucasus and of *M. sativa* from America were significantly less susceptible than those of the control variety Grimm and are of interest as possible sources of homozygous wilt-resistant material. The various strains differed with respect to the intervals of time between inoculation and appearance of top injuries. It is suggested that the strain of *M. falcata* from Alaska, originally from Siberia, may be useful in breeding varieties adapted to regions north of the present boundaries of lucerne cultivation, and that *M. sativa* (= *M. coerulea*), originally from Georgia, USSR, may be valuable in breeding lucerne for southern range-areas; the latter strain has shown satisfactory resistance to stem nematodes; both strains are wilt-susceptible and would require screening for any resistant plants.

335 **Promising new strain of barrel medic.**
Rur. Res. CSIRO 1954 : No. 8 : 12–13.

Barrel medic (*Medicago tribuloides*) 173, a new strain selected in New South Wales by the Division of Plant Industry of the Commonwealth Scientific and Industrial Research Organization, Australia, is described. The plants display vigorous growth and are suitable for cultivation in regions where the growing season is short and the soil unsuited to subterranean clover; the pods and seeds are relatively free from spines and are readily eaten by cattle.

336 VALLE, O.
Kokemuksia kanadalaisesta Altaswede-puna-apilasta. (**Observations on Canadian Altaswede red clover**).
Koetoim. ja Käytäntö 1953 : No. 4 : p. 1.

Data are given on the comparative behaviour of the red-clover varieties Altaswede and Tammisto at a number of localities in Finland. For single-year leys Altaswede is quite satisfactory, but owing to its inferior resistance to overwintering conditions it gives a lower hay yield in two-year leys.

337 MÄRKI, H.
Entwicklung und Stand der Mattenkleezüchtungen in Oerlikon. (**Development and state of red clover breeding in Oerlikon**).
Schweiz. landw. Z. 1954 : **82** : 809–15.

It is pointed out that varieties of foreign provenance are frequently not adapted to cultivation under Swiss conditions. The new red clover strains Oerlikon 28d, 33a and 24a have outyielded Aberystwyth S123 and S151 in recent trials conducted by the Oerlikon Research Station.

338 MANNER, R.
Essi original Hammenhög stam 102. (**Essi original Hammenhög, strain 102**).
Våren 1952. Hammenhögs, Otto J. Olson & Sons AB : 19–20.

This new red clover strain, released to the Swedish market by Otto J. Olson and Sons, is more resistant than the 1935 Essi élite to clover rot and produces a more luxuriant stand in early summer. It grows fast in the spring and after cutting, and is ready for harvesting 6–10 days before Bara and Øtofte tidig [Øtofte Early], and 10–14 days before the medium late clovers Lindby II and Merkur. Flowering takes place uniformly and relatively quickly.

339 IGNATJEVSKAJA, S. N.
(**Red clover in the arctic circle**).
Priroda (Nature), Leningrad 1954 : No. 5 : 101–04. [Russian].

Research to improve a subarctic form in the Murmansk province is mentioned. This form, originating from the Pečora basin, has a shorter growth period than the hardy late varieties cultivated in northern Russia and Siberia and yields more seed and green matter.

340 FRANDSEN, K. J.
Lidt om Arbejdet med de resistente Kløverstammer. (**Notes on the work being done with resistant strains of clover**).
Tidsskr. Frøavl 1954 : **22** : 4–6, 22–26.

This article deals largely with the methods used in the infection and testing of varieties and breeding strains of red clover for resistance to eelworm and clover rot at Øtofte and other Danish experimental stations.

Tables of results of resistance tests during 1951–53 show that one strain, Halvsildig Øtofte Resistent III [Medium-Late Resistant III], has surpassed Halvsildig Øtofte III, Halvsildig Dæno III and Halvsildig Trifolium III in resistance to clover rot and also to eelworm to some extent.

Stressing the difficulty of breeding for resistance to two or more characters, the writer suggests that, in the official testing of crop plants in Denmark, due attention should be given to characters such as resistance to diseases and pests in grading experimental varieties and strains submitted for testing.

341 BREWBAKER, J. L.
Incompatibility in autotetraploid *Trifolium repens* L. I. Competition and self-compatibility.
Genetics 1954 : **39** : 307–16.

In further investigations at the Department of

Plant Breeding, Cornell University, Ithaca, NY, 11 diploid clones and the 11 corresponding 4*n* clones propagated from colchicine-doubled sectors were selfed and cross-pollinated. All the 2*n* clones were cross compatible and self incompatible (SI); three of the 4*n* clones were self compatible (SC), the remaining eight being self incompatible. Two of the three SC clones and seven of the SI 4*n* clones were intercrossed in all combinations. The types of behaviour shown by 15 F_1 and two I_1 families, upon self pollination, were grouped as follows: (1) SC selfed → all SC; (2) SC x SC → 1 SI : 8 SC; (3) SI x SC → 1 SI : 2 SC; (4) SI x SI → 11 SI : 25 SC; and (5) SI x SI → all SI. These results support the hypothesis that self compatibility in autotetraploids is due to competitive interaction between certain *S* alleles in heterogenic 2*n* pollen grains and that such grains function in cross pollinations with a frequency equal to that of other uninhibited grains (cf. *PBA*, Vol. XXIV, Abst. 3081). A maximum of at least five, and possibly seven, of the 71 different heterogenic combinations of *S* alleles tested effected self fertilization through competition. A frequency of this magnitude (8–10%) would be sufficient to cause self compatibility in a large proportion of the plants in advanced-generation 4*n* populations; the undesirable capacity to inbreed could however be readily eliminated at any stage in breeding.

342 Gorman, L. W.
Strains of strawberry clover.
Proc. 15th Conf. N.Z. Grassl. Ass. 1953 : 151–56.

Strains collected from Australasia, Asia Minor and the USA were classified into three groups on the basis of their morphological characters and growth habits, at the Grasslands Division of the Department of Scientific Research, Palmerston North, New Zealand. The Palestine strain, from Australia, proved superior to all other strains on fertile, low-lying soils and selection to improve this type is in progress.

343 Hawkins, R. P.
English Giant Red Suckling clover.
J. Brit. Grassl. Soc. 1954 : **9** : 149–51.

Cytological and morphological investigations at the National Institute of Agricultural Botany, Cambridge, England, have shown that Giant Red suckling clover (2*n* = 28) is a form of *Trifolium dubium* (= *T. minus*). Its vigorous growth distinguishes it from other forms of the species.

344 Sandal, P. C.
Association and variation of certain agronomic characters in space planted F_4 bulk lines of Korean lespedeza.
Agron. J. 1954 : **46** : 333–34.

Plant-to-plant variation in seed production, date of flowering and plant spread in F_4 bulk-lines from two crosses was studied at the Arkansas Agricultural Experiment Station. The wide range of variability found within and between lines suggested that selection for these characters singly should be possible. A high positive correlation was detected between seed yield and spread. The negative correlation found between seed yield and time of flowering suggested that selection for intermediate maturity would be the most desirable when seed production is required. Selection for plant spread only would be less critically influenced by maturity than selection for seed production. Since most of the correlations calculated on the progeny-mean basis were higher than the pooled correlations in selection emphasis should be laid upon family properties rather than individual plant characters.

345 **Lespedeza resists nematodes.**
What's New Crops & Soils 1954 : **6** : No. 9 : p. 36.

The variety Rowan (cf. *PBA*, Vol. XXII, Abst. 481) is reported by the US Department of Agriculture to be resistant to *Meloidogyne incognita* and *M. incognita* var. *acrita*.

346 Smith, W. K.
Viability of interspecific hybrids in *Melilotus*.
Genetics 1954 : **39** : 266–79.

On the basis of the results of artificial crossing, the eight species studied, belonging to the subgenus *Eumelilotus*, are classed into three groups. Group A consists of *M. alba*, *M. polonica* and *M. suaveolens*; except for the aborted seeds produced when certain strains were used in crosses between *M. alba* and *M. suaveolens*, crosses among these three species gave rise only to normal green hybrids. *M. altissima*, *M. dentata*, *M. taurica* and *M. wolgica* constitute group B. *M. suaveolens* x *M. altissima* and *M. suaveolens* x *M. taurica* gave only aborted seeds, but when hybrid seedlings were obtained from crosses between members of groups A and B they were almost devoid of chlorophyll, surviving only a few days unless grafted on normal sweet-clover plants. Seedlings from crosses within B

possessed less chlorophyll than normal but more than those resulting from hybridization between members of A and B. *M. officinalis* is assigned to a third group, C, since no mature seeds were secured from hybridization with any other species. The character of chlorophyll deficiency, forming an effective barrier to interspecific hybridization under natural conditions, is discussed in relation to its possible significance in the evolution of species in the subgenus *Eumelilotus*.

347 MANNER, R.
Weiko III, ny gulblommig sötlupin. (**Weiko III, a new yellow-flowered sweet lupin**).
Våren 1952. Hammenhögs, Otto J. Olson & Sons AB : 3–6.

This white-seeded variety of *Lupinus luteus* was bred in Germany. Its desirable characteristics include: rapid growth, almost complete freedom from any admixture of bitter lupins, little tendency of the pods to split and thus shed their seeds, soft seed coat so that formation of hard seeds is rare, and good yield of green forage. White seed coat is recessive, so any hybrid admixture can be detected in the F_1.

348 **Yellow fodder lupin.**
Windmill, The Hague 1954 : No. 14 : 18–19; (also in French, 16–18; and German, 19–21).

Recent progress in breeding new varieties with freedom from alkaloids, rapid initial growth, nondehiscent pods, soft seed-coats and increased resistance to disease is outlined. The varieties Weiko III and Palvo are the most suitable for cultivation under Netherlands conditions and new strains of the Palvo type are at present being developed.

349 VASILJČENKO, I. T.
(**A survey of species in the genus *Trigonella* L.**).
Šiškin, B. K. [Editor]. (Flora and systematics of higher plants). No. 10. Trud. bot. Inst. V. L. Komarov (Proc. V. L. Komarov bot. Inst.) Ser. 1 : 1953 : 124–269. [Russian].

A classification of this genus, with detailed descriptions and keys to the determination of its 128 known species, is presented and a probable history of their origin is outlined.

350 RACHIE, K. O.
Winter hardiness of birdsfoot trefoil strains and varieties.
Diss. Abstr. 1954 : **14** : Publ. No. 8137 : p. 904. (Abst.).

The relative hardiness of varieties of birdsfoot trefoil and other legumes was studied in artificial freezing tests. The birdsfoot trefoil varieties Empire and Viking had good hardiness but were less cold-resistant than the lucerne Ranger; Cascade and Granger were intermediate.

ROOTS AND TUBERS

351 MANNER, R.
Hammenhögs rotfrukter i Skånes Fröodlingsförenings försök 1946–50. (**Hammenhög root crops in the Skåne Seed Production Association's experiments in 1946-50**).
Våren 1952. Hammenhögs, Otto J. Olson & Sons AB : 7–18.

The performance of the following Hammenhög varieties is shown in tables accompanied by a brief commentary on yield of roots and tops, dry matter content, suitability for machine harvesting, and tendency to bolting: the sugar mangels Ljusröd orig. Hammenhög [Light Red Hammenhög] and Gullåker orig. Hammenhög; the swedes Bangholm orig. Hammenhög and Patria Wilhelmsburger orig. Hammenhög; and the mangels Barres orig. Hammenhög and Globus orig. Hammenhög.

352 STEUDEL, W. & HEILING, A.
Die Vergilbungskrankheit der Rübe. (**The yellows disease of beet**).
Mitt. biol. ZentAnst. Berl. 1954 : No. 79 : Pp. 132.

An account of the virus, and of its effects and methods of control is presented; *Myzodes persicae* is of considerably more importance as a vector than *Doralis fabae*. In investigations at the Institute of Root Crops, Münster, sugar beets proved less sensitive to yellows than did mangels. A negative correlation was established between amount of foliage and loss in yield due to the virus and a positive correlation between size of root of a particular variety and extent of damage likely to be caused by infection. It was assumed, but not proven, that a negative correlation exists between amount of sugar in the root and sensitivity to the virus. Comparisons of different sugar beet varieties showed that the yield of infected Z and E strains was not reduced to the same extent as that of N strains and that polyploid sugar beets were less sensitive to yellows than diploids. In mangels, differences in sensitivity between different genotypes were also noted. It is concluded that less sensitive strains of beet may be developed by selection.

353 MANNER, R.
Hammenhögs Kofor Barres. Ny foderbetsstam med högt odlingsvärde. (**Hammenhög Kofor Barres. A new strain of mangel of high cultivation value**).
Våren 1954. Hammenhögs, Otto J. Olson & Sons AB : 3–8.

The new strain is very high yielding, and, having also a high dry matter content, good storage properties and little tendency to bolt, is recommended for general use in Sweden. Originally known as Barres 41–87 : 39, the new strain was derived from a single élite beet (I–39) selected in 1940 from Barres Hammenhög.

354 MANNER, R.
Nya försöksresultat med Gullåkerbetan. (**New experimental results with the Gullåker beet**).
Våren 1953. Hammenhögs, Otto J. Olson & Sons AB : 9–11.

Yield figures for the Gullåker sugar mangel in annual experiments at Gullåker Plant Breeding Institute in Sweden have shown the superiority of this variety in total dry matter and yield of tops. It also forms a uniform stand, with the neck 2–3 cm. above the soil, and is therefore well suited for topping and harvesting by machine.

355 HOSODA, T.
(**On breeding new types of *Brassica napus*. II. Fertility of *B. napus* obtained by breeding**).
Ikushugaku Zasshi/Jap. J. Breeding 1953 : **3** : No. 2 : 44–50. [Japanese].

This paper is the full version of the article summarized in *PBA*, Vol. XXIII, Abst. 1284.

356 SCHEIJGROND, W. & VOS, H.
Investigation on the susceptibility to club root.
Euphytica, Wageningen 1954 : **3** : 125–39.

With reference to the Netherlands, the authors survey the occurrence of club root, damage caused by the disease, and also field investigations on the susceptibility of different crops, differences in susceptibility among swede and turnip varieties and on the possible existence of physiological races. Only in swedes and turnips have considerable varietal differences in susceptibility been found. Among the turnips, varieties belonging to the types Halflong Green-Top Yellow, Halflong Purple-Top White, Flat Round Yellow and Round Yellow-fleshed are less susceptible than other types. The type Halflong Purple Top White, to which the chief varieties in the Netherlands belong, shows the greatest variation in susceptibility; varieties of other types show only small differences in reaction. Some foreign varieties of turnips reputed to be resistant have been more or less badly infected, e.g. Weibulls Immuna II. Resistance may be correlated with sweet taste. Selection has resulted in new varieties of the type Halflong Purple-Top White, now released for trial.
Some of the variety trials on turnips have indicated the probable occurrence of physiological races of the club-root pathogen.

357 Winterkoolzaad, 1954. (**Winter rape, 1954**).
Landbouwvoorlichting 11 : Bijl. 17; Ber. Rassenkeuze 1954 : No. 169 : unpaginated.

The results of variety trials of the four principal varieties grown in the Netherlands are presented and show that in 1954 the new variety Dippe's Platzwiderstandsfähiger [Dippe's Nondehiscent] outyielded Lembke, the variety most widely grown in the Netherlands, on all types of soil. Dippe's is described as having shorter straw, maturing slightly earlier and being more winter hardy than Lembke, with which it is in other respects similar.

358 **Potato variety trials.**
Mon. Rep. Minist. Agric. N. Ire. 1954 : **29** : 143–44.

The results of trials conducted during 1953 at five centres in Co. Antrim are presented. Of the six early varieties tested, Ulster Ensign and Ulster Prince produced the highest yields. The tubers of Ulster Prince developed more rapidly to a size suitable for marketing than those of the other varieties. Of five maincrop varieties, Ulster Supreme gave the highest yields and Arran Peak and Stormont proved the most resistant to disease.

359 AVANZI, E.
Alla ricerca di varietà italiane di patata. (**Searching for Italian potato varieties**).
Ann. Fac. Agr. Pisa 1953 : **14** : 135–40.

Favourable mention is made of a selection from the cross Jubel x Tonda di Berlino made in 1947; the new variety, named San Michele, produces 8–12 tubers per plant, of even size and borne close together. It is early, resistant to drought and moderately resistant to blight; it does well even in soils of medium or low fertility and its tubers cook well and have a high protein content.

360 Pohjanheimo, O.
Jaakko- ja Peippo-perunat. (**Jaakko and Peippo potatoes**).
Koetoim. ja Käytäntö 1953 : No. 4 : 2–3.

The two potato varieties Jaakko (Eigenheimer x Goldwährung), and Peippo [Chaffinch] [Kalev x (Maatiaisperuna x Pepo)], are described. Jaakko is a good all-purpose potato for early or late use and is useful for both fodder and cooking purposes. Peippo is a high-yielding variety that succeeds even in dry seasons; it is recommended for central and east Finland.

361 Virnes, E.
Perunan lajikekokeen tuloksia v. 1953. (**Results of potato variety trials in 1953**).
Koetoim. ja Käytäntö 1953 : No. 11 : 1–2.

A summary of Finnish variety trials in 1953 is given with data for yield, size of tuber, starch content and resistance to diseases. Two recently introduced culinary potatoes, Aquila and Tammisto 01783, are recommended for both quality and yield.

362 Manner, R.
Hammenhögs Privera-potatis. (**The Hammenhög potato Privera**).
Våren 1953. Hammenhögs, Otto J. Olson & Sons AB : 12–20.

Erfarenheter av Hammenhögs Privera-potatis. (**Experience with the Hammenhög Privera potato**).
Våren 1954. Hammenhögs, Otto J. Olson & Sons AB : p. 13.

Placed on the Swedish market in 1952, this new variety was selected in 1946 from a relatively unpronounced bolter type derived from Early Puritan (cf. *PBA*, Vol. XXIV, Abst. 2137). Morphologically, it resembles the parent except for its (1) more vigorous haulms, which die off later than those of Early Puritan; (2) its more abundant flowers; and (3) deeper anthocyanin colouring of the stems. It is also more resistant to blight and retains its berries until a riper stage is reached.
In 15 trials it has surpassed Early Puritan, except during the first two weeks of lifting. Tested with other early and mid-early varieties, its flavour and keeping qualities were good. It is recommended to producers of early potatoes to supplement Early Puritan and also to the domestic grower.

363 **The present state of potato breeding in the Netherlands.**
Windmill, The Hague 1954 : No. 14 : 24–26; (also in French, 23–24; German, 26–27; and Spanish, 27–28).

A popular account of the history of potato breeding in the Netherlands and of the work of the Government Institute for Research on Varieties of Field Crops is presented, special emphasis being laid on the use of wild species to obtain resistance to late blight, the potato eelworm and the Colorado beetle.

364 Johansen, R. H. & Schultz, J. H.
Potato variety trials in 1953.
Bi-m. Bull. N. Dak. agric. Exp. Sta. 1954 : **16** : 132–36.

The results of trials conducted during 1953 by the Fargo Experiment Station, N. Dak., are presented. Of the 19 red-skinned varieties tested, Redburt and Red Pontiac gave the highest yields.

365 **Redglo potato released.**
What's New Crops Soils 1954 : **6** : No. 9 : p. 27.

Redglo, a new potato with dark red tubers suitable for cultivation in western Nebraska, has been released by the Nebraska Agricultural Experiment Station. It is described as a good general-purpose potato, suitable for both boiling and frying.

366 Gottschalk, W.
Die Chromosomenstruktur der Solanaceen unter Berücksichtigung phylogenetischer Fragestellungen. (**The chromosome structure of the Solanaceae with reference to phylogenetic questions**).
Chromosoma 1954 : **6** : 539–626.

A detailed study of the structure of the pachytene chromosomes of 19 tomato varieties, 28 *Solanum* species and representatives of 26 other Solanaceous genera is reported. Attention was principally devoted to the distribution and number of chromomeres in the heterochromatic segments.
Varietal differences were noted in the length of the satellite and of the achromatic zone in the tomato chromosomes.
With regard to the genus *Solanum*, it appeared that a relatively small number of heterochromatic chromomeres was a primitive character and that an increase had accompanied evolutionary advance. Species believed to be closely related taxonomically generally had similar heterochromatic segments. An analysis was also made of the relationship between

polyploidy and the number of SAT chromosomes. The marked secondary pairing in *S. tuberosum* is interpreted as evidence of autopolyploidy.
The other genera investigated were regrouped on the basis of their chromosome structure; *Cestrum* and *Nicotiana* are believed to be taxonomically remote from other members of the Solanaceae since a distinction between euchromatin and heterochromatin cannot be made out in plants belonging to these genera.

367 Swaminathan, M. S. & Hougas, R. W.
Cytogenetic studies in *Solanum verrucosum* variety *spectabilis*.
Amer. J. Bot. 1954 : **41** : 645–51.

S. verrucosum var. *spectabilis* has a chromosome number of $2n = 72$, whereas other varieties are diploids ($2n = 24$). It is meiotically regular and self fertile, and morphologically distinct from the diploid forms. Crosses between var. *spectabilis* and diploids of *S. verrucosum* failed but reciprocal crosses with *S. demissum* ($2n = 72$) were successful. The F_1 hybrids showed pollen and ovule sterility. At metaphase I, 14 to 30 bivalents were formed per cell; this behaviour is contrary to the generally held view that species belonging to sect. *Tuberarium* are not differentiated chromosomally. Var. *spectabilis* is concluded to be a distinct species, *S. spectabilis*.

368 Thijn, G. A.
The raising of first year potato seedlings in glasshouses.
Euphytica, Wageningen 1954 : **3** : 140–46.

A method of obtaining virus-free clones from seedlings raised in the glasshouse is described in detail; the procedure has proved valuable in breeding at the Prof. Broekema Farm, Marknesse, North-east Polder, Netherlands. Seeds from crosses are sown in the glasshouse and the resulting seedlings are subjected to preliminary selection for a number of characters. The largest tuber of each plant is usually retained; the tubers are planted in the field the following year for further seedling selection. Two series of seedlings are raised in the glasshouse during a single year, the first batch of the seed being sown in January.

369 Zubeldia Lizarduy, A. & Campos, G. L.
Observaciones sobre la floración y fructificación de 40 variedades de patata (*Solanum tuberosum*). [**Observations on flowering and fruiting in 40 varieties of potato (*S. tuberosum*)**].
Bol. Inst. Invest. agron., Madr. 1954 : **14** : 47–73.

Data are given for time and duration of flowering, number of flowers, and fruit and seed formation in 40 potato varieties, some Spanish and some imported. The earliest varieties to flower were Saskia and Alma, the latest Basabe, Industrie and Alpha. All varieties flowered profusely in the north of Spain with the exception of Royal Kidney, Eersteling and Arran Banner, but few of them set seed in any quantity; the best seed sets were given by Alegría Oro [Gold Joy], Alma and Bezana; all these varieties produce pollen in large quantities but several other varieties characterized by good pollen production formed few fruits, e.g. Aquila, or none at all, e.g. Urgenta, Encarnada de la Rosa [Rose Scarlet] and Prummel 202.

370 Pohjanheimo, O.
Perunalajikkeiden sadon säilyvyydestä. (**On the conservation of potato varieties**).
Koetoim. ja Käytäntö 1953 : No. 9/10 : p. 3.

A review of experiments during 1934–52 on the keeping qualities of various potato varieties of Finnish and foreign origin is given. Earlier experiments showed Ruusulehti [Rosafolia] to have the best keeping qualities; some of the varieties introduced later, namely Aquila, Agnes, Johanna and Merkur, also kept well.

371 Svensk sortlista för potatis. (**Swedish variety list for potatoes**).
Sverig. Potatisodl. Riksförb., Stockh. 1954 : Pp. 22.

The 26 varieties described comprise potatoes for table, fodder and industrial uses. The criteria used in comparing varieties included earliness, yield, flavour, dormancy, content and yield of starch, cooking qualities, size and shape of tuber, disease resistance and depth of eyes. Tables are appended showing the country of origin of the different varieties and their date of release for the market, as well as some of the above-mentioned characteristics.

372 Buhr, H.
Beobachtungen über Parasitenbefall an Pfropfungen und Chimären von Pflanzen. (**Observations on the attack of parasites on grafts and chimeras of plants**).
Züchter 1954 : **24** : 185–93.

The susceptibility of varieties of potato and tobacco to attack by *Phytophthora infestans* and other diseases was not influenced by their being grafted on to resistant varieties in experiments conducted at the Institute for Plant Breeding, Gross-Lüsewitz, Eastern Germany.

The progeny of susceptible scions also proved susceptible.

373 **Relationship of potato races of *Phytophthora infestans* and genes for resistance.**
Amer. Potato J. 1954 : **31** : 238–39.

This article includes tabulated data giving, in an abbreviated form, the recent proposals for an international nomenclature of races of *Ph. infestans* and of genes controlling immunity in *Solanum demissum* derivatives (cf. *PBA*, Vol. XXIV, Abst. 2168).

374 Howatt, J. L. & Hodgson, W. A.
Testing for late blight resistance in the potato in Canada.
Amer. Potato J. 1954 : **31** : 129–40.

Work carried out during the past 20 years at Fredericton, NB, on testing seedlings for late-blight resistance is described in detail, with particular reference to *Solanum demissum* x *S. tuberosum* derivatives. Prior to 1949, little evidence was obtained of specialized races of the fungus. In 1951 and 1952, Keswick and Canso, hitherto resistant, showed infection under field conditions. When tested on a series of differential varieties and seedlings from Great Britain and the United States, isolates of the fungus from Keswick and Canso behaved erratically; in addition, one isolate caused infection on all the differential hosts employed. It is suggested that existing schemes for the classification of races of *Phytophthora infestans* are inadequate and that resistance is governed by more genes than those already postulated.

375 Niederhauser, J. S., Cervantes, J. & Servin, L.
Late blight in Mexico.
Amer. Potato J. 1954 : **31** : 233–37.

The genetical basis of resistance to *Phytophthora infestans* is discussed and the literature on the subject reviewed. Central Mexico contains wild species other than *Solanum demissum* that could be used in breeding resistant commercial varieties; it is emphasized, however, that new physiological races of the blight will continue to appear wherever new, temporarily resistant, varieties are cultivated on a large scale. The writers have isolated a number of highly specialized races of late blight in Central Mexico and suggest that the present picture of the resistance of wild species in this area is a preview of what may be expected in other places where and when new resistant varieties are increased for commercial production.

376 Akeley, R. V. & Buck, R. W.
Breeding for resistance to late blight.
Amer. Potato J. 1954 : **31** : 165–72.

An account of the work since 1932 of the Maine Agricultural Experiment Station in breeding varieties of potato resistant to *Phytophthora infestans* is given. Seed of the W varieties received from Berlin has made a valuable contribution to the creation of lines resistant to most physiological races of blight prevalent in the USA; these lines are now being crossed and back-crossed to popular varieties in order to incorporate the genes for resistance into commercially acceptable types. Observations on the epidemic of late blight that occurred in Maine during 1951 showed Kennebec to be resistant to all the common physiological races of the fungus, but laboratory tests have shown that it is susceptible to several of the more virulent strains.

377 **Delhus potato released.**
What's New Crops Soils 1954 : **6** : No. 9 : p. 27.

Delhus, a new medium to late potato developed by the Delaware Agricultural Experiment Station and the US Department of Agriculture, is described. It gives high yields of good quality tubers and is resistant to late blight.

378 Zadina, J.
(Breeding potatoes for resistance to *Phytophthora*).
Za socialist. seljskohozjaĭstv. Nauk. (For socialist agric. Sci.), Praha 1954 : Ser. A : 169–81. [Russian].

An account of Czechoslovak experiments on breeding potatoes for resistance to *Ph. infestans* is given. Erika, which transmits resistance to some of its progeny, did not give an appreciably higher or lower percentage of resistant types when crossed with other domestic varieties. It is therefore concluded that the mode of segregation in respect of resistance is determined to a greater extent by the parental form that shows resistance to *Phytophthora*, than by the susceptible parent. Hence, only analyses of the resistant varieties are regarded as of value to the breeder. The degree of resistance was evaluated on the basis of tests with 15 races of *Phytophthora* and of percentages of healthy plants obtained by self pollination or hybridization of each maternal parent with other susceptible and resistant forms. Erika, Robusta,

Kameraz I, Kameraz II, Kameraz III, Sandnudel and Fitoftoraustoĭčivyĭ [*Phytophthora*-resistant] were distinguished by a high degree of resistance. Resistant hybrids, including many from crosses involving a susceptible parent, have been selected. *Phytophthora* resistance has not been correlated with wart resistance, earliness, external or internal tuber colour or the type of eyes.

379 Ivančenko, G. Z.
(A new standard variety of potato).
Sad i Ogorod (Gdn. & Veg. Gdn.) 1954 : No. 6 : p. 41. [Russian].

The early wart-resistant Latvian variety Priekuli, from Cobbler x Jubel, outyielded Ėpron in recent trials and has been made a standard in the Moscow province.

380 Goffart, H. & Ross, H.
Untersuchungen zur Frage der Resistenz von Wildarten der Kartoffel gegen den Kartoffelnematoden (*Heterodera rostochiensis* Wr.). [**Investigations on the question of the resistance of wild species of potato to the potato nematode (*H. rostochiensis* Wr.)**].
Züchter 1954 : **24** : 193–201.

The results of experiments conducted from 1951 to 1953 at the Institute for Root Crops, Münster, and at the Max Planck Institute, Voldagsen, are reported. Of the 21 wild species tested, *Solanum* aff. *famatinae* ($2n = 24$), *S. vernei* ($2n = 24$), *S. andigenum* ($2n = 48$), *S. capsicibaccatum* ($2n = 24$), *S. microdontum* ($2n = 24$) and *S. suaveolens* ($2n = 24$) proved the most resistant. In a number of species considerable variations were noted in the degree of resistance of different strains, for example in *S. stoloniferum* ($2n = 48$) the number of cysts per metre of root varied from 215 in EBS 123 to 30 and and 31 in EBS 134 and 161, respectively. In crosses of *S. vernei* (= *S. ballsii*) with the cultivated and highly susceptible variety Sieglinde, resistance was transferred to a large number of plants in the F_1, which also produced good yields of tubers. The F_1 of *S. vernei* 'EBS 181' x Sieglinde possessed a greater degree of resistance than the F_1 of *S. vernei* 'EBS 195' x Sieglinde. Colchicine treatment of *S. vernei* produced polyploid plants which are to be used for future crosses with cultivated varieties. It is concluded that resistance in *S. vernei* is polygenically determined and that resistance is dominant over susceptibility; resistance in *S.* aff. *famatinae* is thought to be monogenically determined.

381 Müller, G.
Ein Beitrag zur Frage der Resistenz auf Virusbefall und Ertrag bei 19 zugelassenen Kartoffelsorten. (Schluss). [**A contribution to the question of resistance to virus infection and yield in 19 authorized potato varieties. (Conclusion)**].
Dtsch. Landw., Berl. 1954 : **5** : 228–34.

Information on the resistance of each of the 19 varieties to virus diseases through four generations of planting is given (cf. *PBA*, Vol. XXIV, Abst. 3137), together with data on tuber degeneration due to environmental conditions. Aquila and Cornelia showed the greatest reduction in yield as the result of degeneration caused by this latter factor.

382 Hooker, W. J., Peterson, C. E. & Timian, R. G.
Virus X resistance in potato.
Amer. Potato J. 1954 : **31** : 199–212.

The genetical basis of resistance to virus X is discussed and three types of resistance, viz. tolerance, hypersensitivity and immunity are distinguished. The literature on the subject is examined and a brief account of work being carried out at the Iowa Experiment Station in breeding resistant varieties given.

383 Ross, H.
Über die extreme Resistenz von *Solanum acaule* gegen das X-Virus. (**On the extreme resistance of *S. acaule* to virus X**).
Mitt. biol. BundAnst. Berl. 1954 : No. 80 : 144–45.

Four different reactions observed in material of wild *S. acaule* from various sources are described. Reaction IV, observed after the grafting of X carriers on *S. acaule*, interspecific hybrids of *S. acaule*, and intervarietal hybrids of *S. acaule*, represents an extreme form of hypersensitivity; it is inherited as a monomeric dominant.

384 Brücher, E. H. & Ross, H.
La importancia de las especies tuberíferas de *Solanum* del noroeste Argentino como fuente de resistencia a las enfermedades. (**The importance of the tuberiferous *Solanum* species of northwestern Argentina as a source of resistance to diseases**).
Lilloa 1953 : **26** : 453–88.

Morphological and cytological descriptions of samples of *S. simplicifolium* ($2n = 24$), *S. vernei* ($2n = 24$), *S. berthaultii*, *S. acaule* ($2n =$

36 and 48) and *S. andigenum* collected in the Andine zone of northwestern Argentina are given.

Some of the samples of *S. simplicifolium* and *S. vernei* appear to offer a source of resistance to viruses Y^n and Y^c. Resistance to leaf roll was found in *S. berthaultii* and resistance to *Phytophthora* in this species and in *S. andigenum* 'Mesada.'

385 Lambeth, V. N.
Sweet potato production in Missouri.
Bull. Mo. agric. Exp. Sta. 1953 : No. 600 : Pp. 24.

Information on yield, growth habit and tuber quality, texture and carotene content is given for 18 varieties suitable for cultivation in Missouri. In trials conducted by the US Department of Agriculture during 1951–52, B4570 and Heart-O-Gold gave the highest yields of marketable tubers among the soft-fleshed varieties and Rols, Orlis 3511 and Jersey Orange among the firm-fleshed varieties.

386 van Schreven, A. C.
Investigations on the flower biology and compatibility of sweet potato (*Ipomoea batatas* Poir)., including some preliminary trials on the germination of the seed.
Pemb. Balai Besar Penj. Pert., Bogor 1954 : No. 139 : Pp. 44.

Observations on the flowering behaviour of approximately 100 clones at the Bogor Institute of Botanical Research are reported, information being given on prolificacy of flowering, opening and withering of the flowers, ripening of the stamens and stigmas, and duration of receptivity of the stigma and of pollen viability. The clones varied considerably in intensity of flowering; only one clone failed to flower; 26 clones blossomed abundantly. In incompatible intervarietal crosses, the pollen failed to germinate on the stigma. Heterostyly was not associated with incompatibility. The 61 varieties tested could be classified into at least six intrasterile groups which were partly interfertile. Reciprocal differences in compatibility were not marked. In a number of clones self pollination in the bud occurred. Further investigations are required before the *S* allelomorphic system evidently present in the sweet potato can be elucidated. Preliminary experiments were carried out on environmental factors affecting fruit and seed setting in crosses and on various aspects of the problem of seed germination.

387 Martin, W. J.
Varietal reaction to *Ceratostomella fimbriata* in sweet potato.
Phytopathology 1954 : **44** : 383–84.

The results of inoculation tests at the Louisiana Agricultural Experiment Station indicated that the reaction of varieties and seedlings to *C. fimbriata* depends upon both the race of the pathogen and the temperature conditions under which the disease develops. Seedling B–6097 showed good tolerance.

FIBRES

388 Simlote, K. M. & Kochrekar, B. S.
Improved strains for Nimar (Madhya Bharat).
Indian Cott. Gr. Rev. 1954 : **8** : 131–35.

The hybrid strains D46–5 and D48–154, superior to Jarila in yield of seed cotton and ginning outturn, are to be released for the Nimar tract.

389 Kalyanaraman, S. M., Neelakantan, L. & Iyemperumal, S.
A note on the range of adaptability of four long linted Karunganni cotton strains.
Indian Cott. Gr. Rev. 1954 : **8** : 189–95.

Trials carried out in the central and southern districts of Madras State indicated that the four new long-linted strains Karunganni 6186–9, 6188–8, 6312–4 and 6874 are superior in yield, halo length and ginning percentage to varieties at present under cultivation in the area. The new strains, which were developed at the Agricultural Research Station, Koilpatti, possess at least as wide a range of adaptability as existing varieties.

390 Ansari, M. A. A., Baluch, M. A., Ghori, K. M. A. & Sandila, D. M.
M-100 an improved variety of cotton.
Pakist. Cott. Bull. 1953 : **2** : No. 3 : 10–19.

In experimental plots and cultivators' fields in Sind, M–100, a selection from the back cross (M4 x Wilds) x M4, has shown superiority over M4 (*Gossypium hirsutum*) in yield and quality. It gives an average yield of 1394 lb. seed cotton per acre and has a staple length of $1\frac{1}{32}$ to $1\frac{1}{16}$ in., 34·5% ginning outturn and a spinning value of 40/60.

391 Knight, R. L.
Cotton breeding in the Sudan. Part II. Egyptian cotton.
Emp. J. exp. Agric. 1954 : **22** : 81–92.

The author concludes his survey of genetical and breeding work on Egyptian cotton in the Sudan (cf. *PBA*, Vol. XXIV, Abst. 3164) with

an account of investigations on jassid resistance, grade, lint strength, yield potential, the "cluster" and "short-branch" characters, earliness and bollworm resistance.

392 JENKINS, J. G.
Coastland—a new long staple cotton for the Southeast.
Bull. Ga. agric. Exp. Sta. 1953 : No. 53 : Pp. 24.

Promising new strain may revive production of Sea Island cottons.
What's New Crops Soils 1954 : **6** : No. 9 : p. 28.

It is hoped that use of the highly productive new variety Coastland, combined with the application of suitable organic insecticides, will result in the successful revival of the Sea Island cotton industry in the south-eastern region of the United States. Coastland has a staple length of $1\frac{1}{2}$ to $1\frac{5}{8}$ in., average lint percentage of 35 and a spinning performance approximately equal to that of the Egyptian Karnak cotton now being imported under quotas. It is about ten days earlier than the old Sea Island varieties.

393 GAVRILOV, G.
(New early-maturing varieties of cotton for regions of the Kara-Kalpak ASSR).
Hlopkovodstvo (Cott. Raising) 1954 : No. 7 : 40–45. [Russian].

New varieties produced by intervarietal and intravarietal crossing followed by selection mature earlier and in the northern part of the Kara-Kalpak republic yield from 9 to 81% more raw cotton than the standard 1306–DV; the best of them are also more wilt resistant. Other new varieties are suitable for the central zones of the republic, where they mature one day earlier than 1306–DV, yield 13–20% more raw cotton, and are superior in both lint quality and wilt resistance. In the southern zone some of the hybrids have exceeded the standard 108–F in earliness and yield of raw cotton.

394 TER-AVANESJAN, D.
(The method of estimating earliness in cotton varieties).
Hlopkovodstvo (Cott. Raising) 1954 : No. 8 : 53–56. [Russian].

The number of days from planting to the time at which the bolls dehisce in 50% of the plants does not, it was found, give a true measure of earliness; the real criterion is the yield of raw cotton produced before the frosts set in, a truly early variety giving 90–95% of its yield before the first frost. The capacity to do this differed in varieties which on the old criteria were classed as equal in earliness. Experiments are reported in which the F_1 of a cross of varieties ripening in 41 and 45 days respectively ripened in 41 days, whereas the F_1 from two varieties both ripening in 40–41 days ripened only after 45 days. Variety 1306, the later of the two referred to above, completed its increase in boll size after 18 days from flowering, but took a further 27 days to reach physiological maturity. On the other hand the other variety, Bolgarka 1 [Bulgarian 1] took 27 days to complete its increase in boll size but attained physiological maturity after a further 15 days; the F_1 was intermediate, taking 24 days to complete growth and 20 to reach maturity. In another cross, the one parent, Bolgarka 1, took 27 days to complete boll growth and a further 11 to dehiscence; in the second parent, Bolgarka 78, the periods were 18 and 27 days respectively and in the hybrid, 30 and 15, which accounts for its later maturity; it gave consequently a lower yield of cotton before the first frost. It is clear from these results that the phase from flowering to maturity comprises two periods, namely from flowering to the completion of boll growth and from there to maturity; these two phases behave independently in inheritance. The application of these principles to cotton breeding should facilitate the production of varieties which make the best use of the growing period from planting to the first frosts.

395 LEWIS, C. F.
The inheritance of cup leaf in cotton.
J. Hered. 1954 : **45** : 127–28.

In a mutant of *Gossypium hirsutum*, termed cup leaf, the adaxial surface of the leaf is curved into a concave form; the bracteoles are also curved and the petals fail to spread out as widely as in normal flowers. The mutant depends upon a single incompletely dominant gene which is independent of the recessive gene for the mutant character of "frego" bract.

396 MEMON, A. M.
Hybrid vigour in cotton.
Pakist. Cott. Bull. 1953 : **1** : No. 11 : 21–29.

Literature on heterosis in intraspecific and interspecific hybrids of *Gossypium* is surveyed, the problems of the commercial exploitation of this phenomenon being discussed.

397 MENZEL, M. Y. & BROWN, M. S.
The significance of multivalent formation in three-species *Gossypium* hybrids.
Genetics 1954 : **39** : 546–57.

Demonstration by the authors that the A_h

genome of *G. hirsutum* differs from the A_1 genome of *G. herbaceum* by two, and from the A_2 genome of *G. arboreum* by three reciprocal translocations led to a reevaluation of multivalent formation in *G. hirsutum*-Asiatic pentaploids and in triple interspecific hybrids of the general constitution (AD)AD. The translocations involving genome A account for all multivalents, except those due to aneuploidy, in *G. hirsutum*-Asiatic pentaploids and their derivatives, and for a major proportion of the multivalents in the three-species hybrids. The remaining multivalents observed in the triple hybrids are attributed to the formation of chiasmata between chromosomes of genomes A and D. Hybrids derived from 2(AD)A hexaploids x 2D species crosses differ in the composition of their A genomes and cannot be assumed to be exactly equivalent to similar hybrids obtained from combinations of synthesized x natural allotetraploids. The practical implications of the multivalent formation involving genome A and of AD chiasmata in breeding are discussed.

398 Chavda, D. H. & Patel, J. N.
A new "cluster" (whorled) mutant in herbaceum cotton.
Indian Cott. Gr. Rev. 1954 : **8** : p. 247.
A mutant of the variety Suyog with shortened internodes and a clustered flowering habit was observed at the Agricultural Research Station, Surat, in the 1949–50 season. The mutant bred true to type, the results of crosses with normal plants of the same variety indicating that it was dependent upon a single recessive gene.

399 Negi, L. S. & Singh, A.
H.14—A new improved strain of American cotton for south-eastern districts of the Punjab.
Indian Cott. Gr. Rev. 1954 : **8** : 162–63.
Compared with the parent strain 216F, reselection H14 shows improved yield, ginning outturn and spinning qualities. In addition, it is more vigorous, matures earlier and exhibits greater uniformity in its boll opening. With the approach of maturity it sheds almost all its leaves, clean picking thus being facilitated.

400 Knight, R. L. & Rose, M. F.
A new approach to the technique of cotton selection.
Emp. Cott. Gr. Rev. 1954 : **31** : 162–70.
The authors discuss the limitations of the pure-line concept in cotton improvement and some attempts, notably the method of mass-pedigree selection devised by Harland, to overcome the loss of plasticity in pure-line selection. They then describe the following technique and its application in selection in the Sudan. The method is based on 1000 progeny rows, each grown from natural seed of a primary selection of the parent variety. The rows in the breeding plot are arranged according to the general plan of alternating two progeny rows with a single row of the parental variety as control. Inferior rows are culled according to field and laboratory performance. Natural seed from the rows passing this stage is sown in a testing plot; rows giving inferior yields are eliminated and laboratory performance is statistically assessed. Selected progenies are bulked, using selfed seed stored from the breeding-plot generation, i.e. from the original progeny rows. The bulked seed is sown in a "panmixis plot." After the production of two to three generations in panmixis plots, a further 1000 selections are made and the cycle is repeated.

401 Hutchinson, J. B.
New evidence on the origin of the old world cottons.
Heredity 1954 : **8** : 225–41.
Recent investigations on the classification, geographical distribution and relationships of wild species of *Gossypium* in Africa and Asia have indicated that the Arabian and Red Sea region constitutes the original range of section *Stocksiana* and not, as was formerly supposed, that of the group *Anomala*. The hypothesis of the author, Silow and Stephens (cf. *PBA*, Vol. XVIII, p. 183) that the cultivated diploid cottons evolved in Sind from a wild species brought from the eastern Sudan or Arabia is therefore no longer tenable. Possible areas from which the ancestor of the Old World diploids might have originated are surveyed; it is concluded that the most likely is the arid bushveld area of southern Africa extending from Ngamiland to southern Portuguese East Africa. In this region *Gossypium herbaceum* race *africanum* grows wild in natural vegetation. The theory that this race is an escape from former cultivations is reconsidered in the light of fresh historical evidence and shown to be without support. Recent research on bollworms has indicated that the evolution of *Diparopsis castanea*, a species endemic in southern Africa, can only have been accomplished on *G. herbaceum* race *africanum*, the view that this race is truly wild thus being substantiated. The development of the cultivated races of *G. herbaceum* occurred far to the north of the area in which *G. herbaceum* race *africanum* is now to be found; it is suggested that the wild cotton, of which this race is the modern representative,

was introduced by traders into the region where it was domesticated. The most primitive cultivated *G. herbaceum* cottons, belonging to race *acerifolium*, probably had their original home in Arabia or the coasts of Persia and Baluchistan. As the crop spread, races *persicum*, *kuljianum* and *wightianum* were differentiated under the selective pressure of new environments. Reasons are given for believing that *G. arboreum* arose in cultivation by differentiation from *G. herbaceum*; race *indicum* embraces the oldest forms of *G. arboreum* and those most closely related to *G. herbaceum*. The distribution of the more primitive types indicates that the centre of origin of this race was in Kathiawar and Gujerat. Differentiation of race *indicum* was followed by the evolution of the northern *G. arboreum* cottons, consisting of races *burmanicum*, *soudanense*, *bengalense* and *sinense*.

402 Malinovskiĭ, N. A.
(Mistaken advice concerning intervarietal hybridization).
Zemledelie (Agriculture) 1954 : No. 7 : 92–98. [Russian].

Cotton breeding methods employed at Odessa and based on the recommendations of Oljšanskiĭ and Gubenko are criticized. Parental material selected for hybridization purposes is said to have been frequently faulty and it is claimed that controls were inadequate and that proper records were not kept. Unproductive new varieties such as Odessa 4 and 5 should have been discarded instead of being used as breeding material for further crosses. Odessa 1 is said to be the only productive variety developed at the station in the last twenty years; Oljšanskiĭ's assertion that it was selected on the basis of earliness in the F_1 is refuted and it is shown that the variety was in fact selected from an F_4 hybrid from the Asiatic Cotton Institute. Among the breeding practices criticized is the widespread use of multiparental pollination; Kiričenko's experiments on wheat are criticized for the same reasons.

403 Lund, Z. F. & Meyer, J. R.
Progress made toward smooth cotton plants.
Miss. Fm Res. 1954 : **17** : No. 5 : p. 1.

Work at the Delta Branch Experiment Station, Miss., in developing smooth-leaved varieties adapted to mechanical picking is described briefly. Crosses of the experimental variety Delta Smooth Leaf with commercial strains has resulted in lines which, although not entirely free from hairs on the leaf and stem, represent considerable progress in this direction. A new type of smoothness, designated D_2, is now being introduced into the breeding programme. It is determined by a single dominant gene derived from the wild species *Gossypium armourianum*, and plants possessing this character have almost completely glabrous leaves, stems and bracts.

404 Stansbury, M. F., Cucullu, A. F. & Den Hartog, G. T.
Cottonseed contents variation. Influence of variety and environment on oil content of cottonseed kernels.
J. Agric. Food Chem. 1954 : **2** : 692–96.

The oil contents of moisture-free kernels of eight commercial varieties of cotton grown at 13 centres in the United States during a three-year period ranged from 26·8 to 43·4%. Both variety and environment had a highly significant effect upon oil content; in each year Acala 1517W had the highest percentage. No evidence of any significant varietal differences in response to variations in temperature and rainfall was obtained from the data on oil content.

405 Ėĭges, E.
(Changes occurring in technological properties of the cotton fibre as the plants develop).
Hlopkovodstvo (Cott. Raising) 1954 : No. 7 : 45–52. [Russian].

The poor fibre quality of some early varieties is associated with the shortness of the period during which they synthesize cellulose, although mention is made of 3521, 2018 and 611b, also characterized by a short period of cellulose synthesis, which produce fibre with good technological properties.

406 Ramaswami, V. & Hassan, M. V.
Note on the method "composite sampling" in replicated F1 hybrid progenies.
Indian Cott. Gr. Rev. 1954 : **8** : 245–46.

Experiments at the Cotton Breeding Station, Coimbatore, suggest that selection of a single seed from each plant in a replication block and measurement of its halo length provide a rapid and effective means of comparing the lint length of a large number of F_1 hybrids.

407 Iyengar, R. L. N.
A method for the determination of the strength of attachment of the fibre to the seed and its effect on the ginning behaviour of different cottons.
Technol. Bull. Indian Cott. Comm. 1954 : No. 49 : Pp. 19.

An apparatus devised at the Technological

Laboratory, Matunga, Bombay, to measure the force required to separate cotton fibres from the seed coat is described. Marked differences in the degree of attachment of the fibres to the seed were noted in the eleven varieties examined; Sea Island strains were most easily separated, an average force of 0·26 g. being required.

408 Ansari, M. A. A.
Survey of cotton in Garo Hill area and Chittagong Hill tracts (East Pakistan).
Pakist. Cott. Bull. 1953 : **1** : No. 11 : 7–15.
The article includes information on the technological properties of single-plant and bulk samples collected in the above areas as material for breeding and agronomic investigations.

409 Honsell, E.
Studio comparato della reazione fotoperiodica di alcune varietà da fibra di "*Linum usitatissimum*" L. (**A comparative study of the photoperiodic reaction of some fibre varieties of *Linum usitatissimum* L.**).
Ann. Fac. Agr. Portici 1951–53 : **20** : 90–118.
Various photoperiodic reactions of the varieties Concurrent, Herkules, Hollandia, Liral Monarch and Wiera were studied in pot and field experiments at Portici, Italy. All five, and especially the first three, proved to be long-day forms.

410 Scarascia, G. -T. & Di Guglielmo, C.
Mutazioni cromosomiche spontanee in *Cannabis sativa*. (**Spontaneous chromosome mutations in *C. sativa*.**)
Ann. Sper. agr. 1954 : **8** : 1557–60.
Seed from the 1952 crop of hemp of the variety Gigante Carmagnola [Carmagnola Giant] when grown in 1953 had a germination percentage of 92% as compared with 98% for 1953 seed; the percentage of aberrant anaphases in the root tips was 1·799 in the 1952 seed as against 0·197 in the 1953 seed. The rapid deterioration of hemp seed is ascribed to its high content of lipids; seed from earlier years failed to germinate at all.

411 Baque, D. G.
The performance of five varieties of kenaf.
Philipp. Agric. 1953 : **37** : 130–35.
Of five types of kenaf compared at the Central Experiment Station of the University of the Philippines from 1951 to 1953, *Hibiscus cannabinus* var. *simplex* had the highest percentage seed germination, flowered and matured earlier than the other types and gave the highest yields of dry seed. Differences in yield of dry fibre were not significant. It is recommended that vars. *simplex*, *vulgaris* and *viridis* be cultivated in preference to vars. *purpureus* and *ruber*.

412 Sanyal, P. & Dutta, A. N.
Inheritance of leaf character in *Hibiscus sabdariffa* L.
Sci. & Cult. 1954 : **20** : 137–38.
The palmately-lobed type of leaf was found to be dominant over the partially-lobed type and to depend upon a single gene L_1.

413 Torres, J. P., Lanuza, E. A. & Cruz, P. I.
Studies on abaca pollination and seed germination.
Philipp. J. Agric. 1952 (1954) : **17** : 183–202.
Experiments on the Philippine variety Itom, showed that (1) pollen viability may be retained for two days, (2) the stigma is receptive as soon as the bract has opened to an angle of 60°, (3) stigma receptivity may last for only two days and (4) the best time for crossing is between 8 and 10 a.m.

414 Sato, Y. & Muto, K.
Ueber die Lebensdauer des Blütenstaubs von *Salix bakko* Kimura. (**On the length of life of the pollen of *S. bakko* Kimura**).
Hokkaido Dagaku Nogakubu Enshurin Kenkyu Hokoku/Res. Bull. Coll. exp. For. Hokkaido 1954 : **17** : 15–22.
Length of life of the pollen is clearly affected by the temperature of the storage chamber, being longest below 0° C, and shortest at atmospheric temperature; pollen stored over Adsol and K_2S and over K_2S alone remains viable for a comparatively long time, depending on the temperature and the amount of K_2S used. Storage in vacuum glass tubes is of great importance in prolonging viability.

SUGAR AND STARCH PLANTS

415 (**Report on the regional tests of sugar-cane varieties in 1951-52**).
Taiwan Tangyeh Chikan/Taiwan Sug. J. Quart. 1953 : **4** : No. 4 : 360–89. [Chinese].
Extensive data on cane production, sugar yield, resistance to pests and diseases and other agronomic characteristics for 64 varieties grown in a series of locations in Taiwan are given.

The varieties N : Co.310, 34–1428, PT43–52 and S17 are considered promising for Taiwan conditions and are compared in detail with the standard varieties F134 and POJ2883.

416 **(Report on the regional trials of sugar cane varieties in 1952-53).**
Taiwan Tangyeh Chikan/Taiwan Sug. J. Quart. 1953 : **4** : No. 4 : 119–54. [Chinese].

This report follows along the same lines as that for the preceding season (cf. Abst. 415). The most promising varieties, which are treated in special detail, were N : Co. 310, PT43–52, 34–1428 and H32–8560.

417 d'Emmerez de Charmoy, D.
Études sur de nouvelles variétés de canne à sucre à l'Ile de la Réunion. (**Studies of new varieties of sugar cane in the Ile de Réunion**).
Rev. agric. Réunion 1954 : **54** : 71–78.

Three new varieties now under cultivation in Réunion are described; they have almost completely displaced POJ36, POJ2878, Co. 213 and Co. 290, high-yielding clones which, however, deteriorated rapidly under the climatic conditions of this region. R337, a selection from a cross between POJ2878 and the low-yielding but hardy North-Indian hybrid Uba-Marot (*Saccharum barberi* x *S. spontaneum*), is giving the best results at present. Although not a high yielder, it is vigorous, hardy and adapted to high altitudes and to regions with a low rainfall, and has been grown successfully in districts previously unsuitable for cane growing. M143/32 and Co. 419 are also descended from POJ2878; they give slightly higher yields than R337 but are not adapted to such a wide range of environmental conditions. Future breeding in the island is to be directed at developing hardy varieties suited to local conditions, increased yield being for the moment of secondary importance.

418 Sornay, A. de
Les variétés de canne B.3337, B.34104, B.37161 et B.27172. (**The cane varieties B3337, B34104, B37161 and B37172**).
Rev. agric. Maurice 1954 : **33** : 111–15.

The performance of the above promising Barbados sugar canes in trials in Mauritius is discussed, with notes on their genetic origin and their biological and other characteristics, including disease resistance and regional adaptation in respect of rainfall. The yields were calculated for virgin canes and first, second and third ratoons.

Memoria de la XXV Conferencia Anual. Asociación de Técnicos Azucareros de Cuba. (**Report of the twenty-fifth annual conference of the Association of Sugar Cane Technologists of Cuba**).
La Habana 1951 : Pp. 419.

419 *Almeida, J. R. de. El florecimiento en la variedad de caña Co. 421.* (*Flowering in the cane variety Co. 421*). (*pp. 99–120*).

Analyses of this cane (cf. *PBA*, Vol. XXIV, Abst. 2273) show that it too reaches maturity only 3–4 months after flowering.

420 *Fors, A. L. Descripción de nuevas variedades de caña de azúcar en Cuba.* (*Description of new sugar cane varieties in Cuba*). (*pp. 121–30*).

The canes described are the following: B3439 from Ba11569 x Q813, which is rich in sugar and tolerant of mosaic but deficient in wind resistance; B34104, from Co. 281 x BH10(12), a high yielder but susceptible to mosaic; B37161, from B3365 x B603; B4098, from B3439 x Co. 290; and B41227, from B35207 x POJ2878.

421 *Fernández Artiles, R. Segundo informe sobre la obtención de nuevas variedades de caña en el central Mercedes.* (*Second report on the production of new cane varieties at the Mercedes centre*). (*pp. 131–38*).

Some 11,000 seedlings have been examined so far in the cane breeding programme of this Cuban station. An excellent seedling, MD414–48, has been produced from the cross POJ2878 x C15855, and another, MD901–48, from ML3–18 x MPR28. The highest sugar content yet recorded has been given by MD868–48, but its vegetative development is weak. MD30–3–49, from C13968 x POJ2878, has the most vigorous vegetative development yet registered and MD13–80–50, from ML13 x C15855, combines vigour of growth with early maturity.

422 *Fernández Artiles, R. La variedad POJ3016 en el central Mercedes.* (*The variety POJ3016 at the Mercedes centre*). (*pp. 139–42*).

In observations in Cuba the variety has displayed freedom from mosaic, has exceeded POJ2878 in yield, and is tolerant of drought on account of its strong root system.

Memoria de la XXVI Conferencia Anual. Asociación de Técnicos Azucareros de Cuba. (**Report of the 26th Annual Conference of the Association of Sugar Technologists of Cuba**). La Habana 1952 : Pp. 294.

The following contributions contained matter of interest to plant breeders.

423 *Méndez, F. Programa para el desarrollo y prueba de las nuevas variedades de caña de azúcar.* (*Programme of development and testing of new varieties of sugar cane*). (*pp. 53–74*).

An outline is given of the cane breeding work at the University of Puerto Rico Agricultural Experiment Station, where some 12,000 seedlings are raised every year and tested, in comparison with standard varieties and canes introduced from other countries, in twelve different parts of the island. A census of varieties has revealed that once-popular canes such as POJ2878, BH10/12 and M275 are being superseded by newer ones such as B37–161, B34104, B41227, PR902, PR905, PR1000 and M336. No cane of the universal type like POJ2878 is now available and the modern canes are each adapted only to particular areas; B37161 has the widest range of adaptation of any of them, has yielded up to 103 tons of cane and 263 q. of sugar per acre and is resistant to mosaic; PR1000 has given record yields of 153 tons of cane and 360 q. of sugar per acre in the Aguirre area where it was bred but does not seem to do so well elsewhere.

424 *Fors, A. L. Descripción de nuevas variedades de caña de azúcar en Cuba. Tercera parte.* (*Description of new varieties of sugar cane in Cuba. III*). (*pp. 75–88*).

A number of cane varieties bred in Australia are described, with brief observations on their behaviour in Cuba.

425 *Fors, A. L. El pequeño colono y la variedad de caña.* (*The smallholder and the variety of cane*). (*pp. 89–93*).

Possible alternatives for Co. 281, which seems to be past its best in Cuba, are discussed. Pepecuca and Co. 301 seem to be among the most promising.

426 Hebert, L. P. & Matherne, R. J.
Results of sugarcane variety tests in Louisiana during 1953.
Sug. Bull. N. Orleans 1954 : **32** : 343–51.

Data on the results of trials conducted in 1953 by the Field Crops Research Branch of the US Department of Agriculture at a number of centres and on different types of soil in Louisiana are tabulated. The varieties N:Co. 310, CP44/101, CP48/103 and CP47/49 gave the highest yields of sugar per acre; N:Co. 310 and CP48/103 had the highest sucrose contents.

427 Gouaux, C. B.
Sugar cane test fields season of 1953.
Sug. Bull., N. Orleans 1954 : **32** : 352–59.

The results of trials conducted at seven centres in Louisiana by the Louisiana State University Agricultural Experiment Station are summarized. Of varieties already in commercial use, CP44/101, CP36/105, CP44/155 and CP44/154 produced the highest yields; among the unreleased varieties N:Co. 310, CP48/103, CP47/193 and CP45/184 gave the best results.

428 Loh [Lo], C. -S. & Tseng, P. -M.
(**Studies on sugar-cane tillering. I. Types of tillers and proportion of tillers surviving**).
Taiwan Tangyeh Chikan/Taiwan Sug. J. Quart. 1953 : **4** : No. 3 : 29–46. [Chinese].

Taiwan varieties are divided into the following four categories in respect of tillering behaviour: (1) cup-shaped stools; (2) bowl-shaped stools and (3) dish-shaped stools, in which the tillers arise all around the primary stem, the angle between the tillers and the ground diminishing from (1) to (3); and (4) fan-shaped stools, where the tillers develop in a single vertical plane. Data are also given on the number and duration of the tillers of the varieties studied.

429 Buzacott, J. H.
Curiosities among the New Guinea canes.
Cane Gr. quart. Bull. 1954 : **18** : 3–8.

Canes noteworthy for the colour pattern of their stalks, hairiness, arrow size or abnormalities in stalk shape are described.

430 Lee, L. -S. [Li, L. -H.]
(**Preliminary studies on the reaction to fertilizer of N:Co310 and PT43-52**).
Taiwan Tangyeh Chikan/Taiwan Sug. J. Quart. 1953 : **4** : No. 4 : 155–66. [Chinese].

The reaction of the thick-stalked varieties PT43–52 and POJ2883 and the thin-stalked varieties N : Co. 310 and Co. X to four levels of NPK fertilizer was determined. The sugar yield of the thick-stalked varieties rose considerably with increase in fertilizer level; the sugar yield of the thin-stalked varieties dropped at

the higher fertilizer levels, apparently because of lodging.

431 Dignadice, P. B. & Orillo, F. T.
Yellow leaf spot of sugar cane.
Philipp. Agric. 1953 : **37** : 36–49.

An account of the yellow leaf spot disease, caused by *Cercospora kopkei*, is given. Observations made in the Philippines of 13 varieties indicated that F108, F109 and Alunan were least susceptible to the disease; all POJ canes cultivated in the area were heavily infected.

432 Gallo, D.
Infestação da broca nas principais variedades de cana. (**Borer infestation in the main cane varieties**).
Rev. Agric., S. Paulo 1954 : **29** : 149–55.

Tests of six cane varieties grown in the state of S. Paulo in Brazil showed CB36–24 to be the most resistant to *Diatraea saccharalis*, the next most resistant being Co. 421 and Co. 413.

433 Smirnov, B. M. & Vorobjeva, N. F.
(**Growing sweet sorghum seed**).
Zemledelie (Agriculture) 1954 : No. 7 : 118–20. [Russian].

Continuous single-plant selection at Saratov for more productive panicles and higher sugar content resulted in the green-matter yield of Saratovskoe Rasvesistoe [Saratov Spreading] being increased by 10% and its sugar content by 7%.

434 Kloen, D. & Speckmann, G. J.
The creation of tetraploid beets. III. Cytological checking in the second generation (the C_2) of the treated material.
Euphytica, Wageningen 1954 : **3** : 154–60.

The purity of C_2 material of sugar and forage beets (cf. *PBA*, Vol. XXIV, Abst. 2295) was checked by cytological sampling of the leaves of young plants raised in the greenhouse from seed of two representative C_1 plants in the isolated plot of the given variety. The results from C_2 plants examined in the winter of 1952–53 were disappointing, percentages of non-tetraploids (triploids and diploids) being as high as 23–36%, but C_2 material checked the following winter gave encouraging results. A single diploid can exercise a highly detrimental effect upon the purity of 4*n* material. Repeated cytological examination is evidently required to maintain the purity of further generations. The influence of foreign monoploid pollen from early bolters was negligible. No evidence of breakdown of the tetraploid condition was obtained.

435 Negovskiĭ, N. A.
(**Phasic development and the production of high-yielding nonbolting varieties of sugar beet**).
Izv. Akad. Nauk SSSR (News Acad. Sci. USSR) 1954 : No. 3 : 32–48. [Russian].

Experiments are described in which various treatments were applied to influence the vernalization and light phases of development. Varieties differed in their response; the experiments indicated that the variety Verhnjačka VR38/303 has a vernalization stage of some 65 days and a light stage of 35–45; however, even when the maximum treatments were given some 30% of plants failed to flower; in other varieties the proportions varied from 21 to 96·8%. Some varieties reacted only to light treatment, their vernalization stage being so short that it could be completed out of doors without treatment; others reacted mainly to cold treatment and had a vernalization stage lasting over 67 days. This latter group included several Swedish and northern varieties, the former group including Italian varieties. It was found that the length of the light stage depended not only on illumination but also on the temperature; at temperatures below 18° C it varied from 25 to 45 days in different varieties.

In breeding sugar beets free from bolting, the seed is vernalized for 45–60 days and sown in spring, to escape winter injuries; by selecting the nonbolting plants, populations have been produced in which the number of bolters has been reduced by half without loss in yield. The investigations have shown however that by vernalizing seeds the vernalization stage is never entirely completed; if the seeds are vernalized for 30–45 days and sown in early spring the vernalization stage is completed in the seedlings during the cool weather. Another method consists of vernalizing for 25–30 days and sowing the seed in the early spring in the greenhouse, where the seedlings are subjected to supplementary lighting, keeping the temperature at 10–12° C for the first 30 days. All plants that bolt in the first or second year are discarded. By applying this method twice to the variety I1305 the degree of bolting was reduced from 36·6% to 9·1%, the yield of roots was increased by 22 c. per ha. and the yield of sugar by 4 c. per ha. Similar results have been obtained with other varieties. The use of the later ripening seeds from a given plot also leads to a reduction in bolting in the progeny, since the forms with a short light stage ripen earlier.

Several varieties with a relatively high bolting percentage were crossed with the nonbolting variety M2; by this means the bolting percentage of variety U1030 was reduced from over 40% to 4·1%, that of M2 being 3·8%; in variety VI591 bolting was reduced from 68% to 32%.

436 Zaĭkovskaja, N. Ė.
(Some characteristics of flowering and fertilization in beet).
Izv. Akad. Nauk SSSR (News Acad. Sci. USSR) 1954 : No. 3 : 79–86. [Russian].

Descriptions, illustrated by photomicrographs, are given of the development of the ovules, the progress of the pollen tubes towards them and the process of fertilization, from which it is concluded that several sperms enter the ovule and fertilize the egg cell and the nuclei of the surrounding somatic cells; the fertilization of these latter was necessary before the zygote could develop fully. Fertilization is selective and when sugar beets were pollinated with their own pollen and then 8 or 24 hours later with pollen of garden beet, 14·3% of coloured seedlings occurred among the progeny in the former case and 4·9% in the latter.

437 Heinisch, O.
Aktuelle Probleme der Zuckerrübenzüchtung. **(Current problems of sugar-beet breeding).**
SB dtsch. Akad. LandwWiss. 1954 : **3** : Pp. 27.

The large proportion of soil removed from the sugar-beet fields of Eastern Germany when the crop is lifted is held to be one of the main causes for the decreasing fertility of the land in areas of extensive beet cultivation. Investigations have shown that the percentage of soil adhering to the lateral roots is greatest in varieties with a long taproot and it is recommended that future sugar-beet breeding programmes aim at developing strains with a short, plump taproot and with a high proportion of the root above ground level.

STIMULANTS

438 Bolsunow [Bolsunov], I.
Für Österreich wirtschaftlich interessante und aussichtsreiche Tabaksorten. **(Promising tobacco varieties of economic interest to Austria).**
Tabakpfl. Öst. 1954 : **5** : No. 2 : 1–3.

Further data on the main varieties cultivated in Austria are given (cf. *PBA*, Vol. XXIV, Abst. 1325).

439 Relazione tecnica 1953. **(Technical report for 1953).**
Tabacco, Roma 1954 : **58** : 143–50.

A report is given of the activities of the Istituto Sperimentale per i Tabacchi [Tobacco Research Institute] in Italy. Observations on varieties have continued and have shown Brasile 11 to be a promising filler tobacco.
Tests have also been made on F_1 seed.
Selection with various forms of *Nicotiana rustica* has proceeded. A high-nicotine selection of Brasile Leccese has reached a nicotine content of 13·84%.
Studies are being made of *N. glauca* and its autotetraploid, *N. diglauca*, on the effect of aging on mutation in seed of *N. rustica* and *N. tabacum*, on the effect of various agents in producing polyploids and mutants, and on crosses of American mosaic-resistant lines with Italian Virginia Bright.

440 Raeber, J. G.
Current experiments to produce improved varieties.
Rhod. Tob. 1954 : No. 5 : 26–27.

Tobacco breeding in progress at the Kutsaga Research Station, S. Rhodesia, includes: (1) improvement of the quality of Vamorr 50, using Hicks and Delcrest as donors of the desired quality; (2) repeated back-crossing of hybrids between the high-yielding tobacco Virginia Gold and good-quality variety Delcrest to the latter parent and (3) development of varieties resistant to nematode or *Erysiphe* mould.

441 Alcaraz Mira, E.
Genética del tabaco. **(Genetics of tobacco).**
Euclides, Madr. 1954 : **14** : 218–21.

This contribution (cf. *PBA*, Vol. XXIV, Abst. 2302) deals with certain miscellaneous items not included in the previous parts.

442 Bolsunov, I.
Die Möglichkeiten der Fixierung der Heterosis bei selbstbefruchtenden Pflanzen und ihre Bedeutung für die praktische Tabakzüchtung. **(The possibilities of fixing heterosis in self-fertilized plants and its importance for the practical breeding of tobacco).**
Fachl. Mitt. öst. Tabakregie 1954 : No. 1 : 19–28.

Various theoretical possibilities of maintaining hybrid vigour beyond the F_1 in self-pollinated plants, including the use of lethal genes to prevent segregation, are examined and rejected as being impracticable. Experiments carried

out by the author in Kiev and Austria with *Nicotiana rustica* and *N. tabacum* have shown that inbreeding does not depress the yield of these species; of twenty crosses effected between inbred lines of different varieties of *N. rustica*, seven displayed hybrid vigour in the F_1. Careful selection from these hybrids resulted in some lines that maintained hybrid vigour in subsequent generations. It is suggested that this preservation of initial hybrid vigour was due to a strong linkage of genes for vigorous vegetative growth and that careful line selection may make it possible to concentrate in a homozygous condition all the genes responsible for the heterosis effect in the F_1.

443 KADAM, B. S., RADHAKRISHNAMURTY, B., KRISHNAMURTY, T. & PATEL, G. J.
A crumpled dwarf mutation in tobacco.
Sci. & Cult. 1954 : **20** : 91–92.

A spontaneous mutant of the variety Kelieu 49 with crumpled foliage is reported from the Central Tobacco Research Institute, Rajahmundry, India. The mutant bred true to type, proved highly susceptible to stem borers, had a high mortality rate and displayed stunted and retarded growth. The curled or crumpled appearance of the leaves was found to be caused by the collapse of the parenchymatous cells immediately below the epidermis and of the vascular bundles in the midribs and secondary veins of the leaf. Crosses and back crosses with normal plants showed the aberration to depend on a single recessive gene, which has been designated l_{cr}.

444 JAKOVUK, A. S.
(Mutual interaction between self pollen and foreign pollen in intervarietal crosses of tobacco).
Agrobiologija (Agrobiology) 1954 : No. 3 : 116–21. [Russian].

Mičurinite experiments on multiparental pollination at Krasnodar involved (1) varieties that were first selfed and then, after an interval of several hours, fertilized with the pollen of another variety, (2) varieties that were first selfed and then fertilized by mixed pollen of two other varieties + self pollen, (3) varieties fertilized by the pollen of another variety and then with self pollen 24 hours later and (4) varieties fertilized by mixed pollen of two varieties with or without the addition of self pollen. Analyses of the results of these experiments suggest that self pollen has a stimulating effect upon hybridization and that high percentages of hybrids are obtained even when pollination with the foreign pollen is preceded by selfing.

445 BURLE, L.
Aperçu sur les problèmes agronomiques. **(Note on agronomic problems).**
Agron. trop., Nogent 1954 : **9** : 452–66.

This survey of research work on cacao in the Ivory Coast and the Cameroons includes a summary of the present breeding programme. Emphasis is being placed upon the selection of high-yielding trees bearing beans of superior quality; particularly good results in these respects have been obtained by selection from the Trinitario type.

446 DERENNE, P.
Au sujet des chromosomes sexuels du houblon. **(Concerning the sex chromosomes of hops).**
Bull. Inst. agron. Gembloux 1954 : **22** : 18–23.

In describing investigations carried out in the cytogenetical laboratory of the Swedish Seed Association at Svalöv, the author stresses the difficulties encountered in his studies of mitosis and meiosis in *Humulus lupulus*. He concludes that the X and Y sex chromosomes cannot be identified unless a tetraploid (XXXY) or triploid (XXY) male plant is obtained.

447 KELLER, K. R. & MAGEE, R. A.
The effect of application rates of nitrogen, phosphorus, and potash on some chemical constituents in two varieties of hops.
Agron. J. 1954 : **46** : 388–91.

The quality characteristics of Late Cluster, but not those of Fuggles, were affected in various ways by the rates of application of fertilizers; it is therefore suggested that new lines should be studied with respect to the possible influence of fertilizers upon their chemical properties.

MINOR CROP PLANTS

448 DE BRUYN, J. W., ELZENGA, G. & KEULS, M.
Selection of living angelica-roots for volatile oil content.
Euphytica, Wageningen 1954 : **3** : 147–53.

The average oil content of the roots of *Archangelica officinalis* can be estimated by determining the oil content of 50 g. of adventitious roots by the volumetric method; the sample should include both thick and thin adventitious roots. Stored roots can be selected on the basis of such sampling during winter. Selected plants bagged or grown in isolation cages give satisfactory sets

of selfed seed; the temperature in the cages should not however be allowed to rise too high as the pollen and pistils are injured by excessive heat.

449 Piovano, A. P. & Melis, L. O.
Variedades comerciales de pimientos. (**Commercial varieties of pepper**).
Experimenta 1954 : **1** : 59–87.

An account is given of references to varieties of *Capsicum* in early botanical literature and of the systems of classification proposed by various authors, followed by descriptions of the main varieties of *C. annuum* and *C. frutescens* grown in Argentina.

450 Morgan, D. T. (Jun.) & Rappleye, R. D.
A cytogenetic study on the origin of multiple seedlings of *Capsicum frutescens*.
Amer. J. Bot. 1954 : **41** : 576–85.

Two varieties showing the contrasting marker characters of pungency *vs.* nonpungency, bright yellow *vs.* dark green immature fruit colour and elongated *vs.* nonelongated fruits were reciprocally crossed. Sets of multiple seedlings derived from polyembryonic seeds were grown to maturity and classified genetically to determine their origin. The haploid members of twin seedlings arose from reduced cells of the female gametophytes, presumably from the synergids, since the antipodals degenerate prior to fertilization in this species. All $2n$ members of twins or triplets were sexual in origin. Data from crosses between female parents heterozygous for the factor determining pungency (P) and pp plants suggested that most unattached $2n$–$2n$ twins arose within single embryo sacs and that only 3 of the 31 pairs of unattached $2n$–$2n$ twins obtained originated from separate embryo sacs. Other types of twins, viz. n–$2n$, n–n and conjoined $2n$–$2n$ twins, apparently also arose within single embryo sacs.

451 Hörberg, Y.
Weibulls Margo höstraps. (**Weibull's Margo winter rape**).
Weibulls Årsb. 1954 : 8–9.

Further trials of this new Swedish variety have confirmed previous results (cf. *PBA*, Vol. XXIII, Abst. 2125) and show that Margo represents an improvement as regards earliness and uniform and short flowering period, combined with stiffer plant habit. Its average oil content for 1951–53 was the same as that of Matador B, but its total yield of oil was 97 kg. per ha. more.

452 Manner, R.
Hammenhögs höstrapsförädlingar i skånska försök 1950–1953. (**Hammenhög winter rape breeding trials in Skåne, 1950-53**).
Våren 1954. Hammenhögs, Otto J. Olson & Sons AB : 14–17.

Regal and Plus, two winter rapes bred at Hammenhög, Sweden, tested in various trials in Skåne, have both proved high yielding. Regal has also shown more resistance to shedding than Matador.

453 Wagner, M.
Inzucht und Heterosis bei Raps und Rübsen. (**Inbreeding and heterosis in rape and turnip rape**).
Z. Pflanzenz. 1954 : **33** : 237–66.

Experiments conducted at the Institute of Field Husbandry and Crop Cultivation, Weihenstephan, Bavaria, on the extent of natural self pollination in rape and turnip rape showed that, in rape, self pollination occurred automatically when the flower was not fertilized by foreign pollen; no reduction in yield resulted but the progeny of self-pollinated plants showed a slight reduction in vigour. In turnip rape, however, natural cross pollination amounted to 85–100% and enforced self pollination led to a marked reduction in yield and greatly decreased vigour in the following generation. Attempts at developing inbred lines of turnip rape failed after the second or third generation, while inbred lines of rape were raised up to and beyond the I_9. Using the winter rape Lembke and the summer rape Liho, a number of inbred lines were obtained in which homozygosis led to the appearance of certain recessive genes, some of which, such as those for early maturing and number of fruits per plant, are of positive value. The inbred lines differed from each other considerably in yield, vigour, oil content, 1000 seed weight and morphological characters; all were inferior to the original parent varieties with the exception of two lines possessing increased number of fruits per plant. Crosses between the inbred lines showed heterosis effects for number of fruits per plant and oil content, but not for number of seeds per fruit, 1000 seed weight or plant height, in which respects they were considerably inferior to the original variety. Crosses of inbred lines possessing factors for early maturity with high-yielding Bavarian varieties resulted in hybrids combining the two qualities. It is concluded that the present experiments were not wide enough in their scope to determine the possible

economic value of exploiting heterosis in rape and further inbreds are to be developed with a view to discovering factors for high oil content and yield. The possibility of developing male-sterile lines, as in maize, is mooted.

454 Stolle, G.
Ein Beitrag zur Ertragszüchtung beim Winterraps. (**A contribution to breeding for yield in winter rape**).
Züchter 1954 : **24** : 202–15.

The results of experiments to determine the variability of yield components, conducted from 1951 to 1952 at the Central Plant Breeding Experiment Station, Müncheberg, and at the Fruit Breeding Institute, Marquardt, are reported. All yield components varied according to environment, interaction between variety and environment playing an important role. High positive correlations were found between total yield of seed per plant and number of pods per plant and between total yield of seed and number of seeds per pod. Negative correlations were established between 1000 seed weight and number of seeds per pod and between oil content and protein content. Oil content proved independent of total yield of seeds per plant and no correlation was found between number of pods and number of seeds per pod.

455 Krylov, A. K.
(**At the Ustj-Labinskiĭ State Varietal Testing Field**).
Zemledelie (Agriculture) 1954 : No. 7 : 79–81. [Russian].

Castor oil. The indehiscent variety Sanguineus 401, which is a standard for this district, gave the highest yields and was the most lodging-resistant of the varieties tested at Krasnodar. The new variety VNIIMK 165 [Institute of Oil Plants 165] has indehiscent capsules and sheds its leaves upon reaching maturity, thus facilitating mechanical harvesting.

Sesame. Kubanec 55 outyielded all other varieties, but is unsuitable for combine harvesting because of its dehiscent fruits. A new indehiscent variety, VNIIMK 76, is undergoing trials.

Sunflower. The standard VNIIMK 1646 gave the highest yields and displayed resistance to *Orobanche*. Two new short-stemmed varieties, VNIIMK 8883 and 8932, are undergoing trials.

Groundnut. Krasnodar 1708 continues to outyield all other varieties. It is resistant to drought and bears pods which are firmly attached to the plant.

456 Chaudhuri, K. L. & Das, A.
High yielding X-ray mutations of *Sesamum orientale* Linn.
Sci. & Cult. 1954 : **19** : 620–22.

X_2 and X_3 forms giving significantly higher yields than the parental controls have been obtained at the Bose Research Institute, Calcutta, by irradiating dry seeds of the black-seeded types 12 and 16.

457 Mazzani, B. & Micheletti de Zerpa, D.
Tetraploides experimentales en especies de *Sesamum*. (**Experimental tetraploids in *Sesamum* species**).
Agron. trop., Venezuela 1953 : **3** : 79–95.

From experiments in which seedlings of *S. radiatum*, *S. prostratum* and *S. indicum* were treated with colchicine, tetraploid plants were obtained from line 49.561 of *S. indicum*; they were smaller than the diploids and 45 days later in maturity; only two of them produced seed, from which S_1, S_2 and S_3 generations were obtained; these too had a significantly lower number of seeds per capsule than the diploid; the seeds were somewhat shrivelled and had a lower oil content. Selection is now being carried out for well-filled seed. The tetraploid plants proved markedly more resistant to aphid (*Myzus persicae*) than were the diploids.
Pollination of *S. radiatum* with the tetraploids gave rise to only matroclinous seedlings and the reciprocal combination gave no seedlings. When the diploid *S. indicum* was pollinated with a mixture of pollen from diploid and tetraploid plants, entirely diploid offspring resulted. The cross *S. indicum* ($4n = 52$) x *S. indicum* ($2n = 26$) produced four plants which differed from both parents and proved to be triploids with 91% sterility.
Cytological examination of the tetraploid plants showed that the number of quadrivalents varied from 5 to 10, the rest being bivalents; secondary association occurred at metaphase I, irregular separation was observed at metaphase II, tetrad formation was irregular, and some 5% of the pollen was sterile.

458 Manner, R.
Hammenhögs Indus oljelin. Ny sort för södra Götalands slättbygder. (**Hammenhög Indus linseed. A new variety for the plains of southern Götaland**).
Våren 1954 : Hammenhögs, Otto J. Olson & Sons AB : 18–19.

This blue-flowered linseed bred at the Gullåker Institute, Hammenhög, Sweden, was derived from a single aberrant plant of Øtofte linseed

in 1948. Its seed is smaller than that of Valuta and it ripens four days later. Plant height shows a certain amount of variation. In 18 comparative trials in Sweden, Indus gave 4% more seed than the other varieties tested. It is recommended primarily for Skåne and Halland.

459 Bagge, H.
Forsøg med oliehørsorter 1949–1952. (**Trials with varieties of linseed, 1949-52**).
Tidsskr. Planteavl 1954 : **57** : 678–90.
This is an extended report on the experiments referred to in *PBA*, Vol. XXIV, Abst. 3241.

460 Putt, E. D.
Note on the value of cotton and paper bags for self-fertilizing sunflowers.
Canad. J. agric. Sci. 1954 : **34** : 326–27.
Under Manitoban conditions, cotton bags, especially of the unbleached type, proved to be more satisfactory than paper bags in obtaining self-pollinated seed. Use of cotton bags may make possible the maintenance of lines which do not set seed under paper bags; the production of lines with greater self sterility and greater crossability may thus be facilitated.

461 Gray, S. G.
Experiments with safflower in southern Queensland.
Tech. Pap. Div. Pl. Industr. Aust. 1954 : No. 2 : pp. 14.
An account of trials of introductions and of reselection work is included; some improvement with respect to nonspininess has been obtained by selection of seed parents without control of pollination but more refined breeding methods are required to supplement such selection. Notes are given on the characters and performance of some of the varieties and strains tested.

462 Gérin, L.
La culture des quinquinas et la production de quinine au Cameroun français. (**The cultivation of the cinchonas and quinine production in the French Cameroons**).
J. Agric. trop. Bot. appl. 1954 : **1** : 21–40.
Plantations raised from selected material of *Cinchona ledgeriana* have been found to yield bark containing up to 10·30% of quinine; and in selection plots a quinine content of 14%, and in one case 15·25% has been recorded.

463 **Annual Report of the Rubber Research Institute of Malaya 1952** (1954) : Pp. 115.
South American clones resistant to *Dothidella ulei* have been introduced into Malaya from Brazil and are to be used for future breeding work. Seedlings from the Panama clone FX25 have also been obtained and may show some resistance to the disease; their yield is, however, expected to be low.
Preliminary trials of the RRIM'600' series, produced from crosses involving some of the highest yielding parents in south east Asia, indicate potential yields considerably superior to those of the RRIM'500' series. RRIM612 and 628 have so far displayed the most vigorous growth.
In tapping experiments during the period 1946–52, differences were noted between clones in response to the double four tapping system, AVROS50 being the least adversely affected by this method. Tjir. 16 showed the best response to the full spiral fourth daily continuous system.

464 Bodin, A.
Olsgården i Hammenhög. (**The Olsgård farm in Hammenhög**).
Lantmannen, Stockholm 1954 : **38** : 768–70.
This article contains an account of: (*a*) various crop plants grown under contract for the plant breeding firm of J. Olson and Son of Hammenhög; and (*b*) the medicinal plants and *Taraxacum*, of which in some years 30,000 plants were raised and tested for rubber content, the best being sent to Svalöf for further study. In seven years the rubber content was more than doubled and in some lines quadrupled, as compared with the original mother plants.

FRUITS AND NUTS

Annual Report of the East Malling Research Station, near Maidstone, Kent, 1st October, 1952 to 30th September, 1953 (1954) : Pp. 232.

465 *Rogers, W. S. I. Pomology.* (*pp. 23–29*).
Attempts to produce improved rootstocks for pears from hybrids between pear and quince continued. *Prunus* species likely to prove useful as parents in breeding cherry rootstocks have been collected.
Late-flowering apple varieties were crossed with Cox's Orange Pippin, with the long-term aim of producing seedlings combining late flowering and desirable fruit quality. Selection of woolly-aphid resistant seedlings continued.
Further raspberry families are being raised, comprising Malling Exploit selfed, Baumforth B selfed, F_2 *Rubus occidentalis* x *R. idaeus*, Boysenberry x Malling Exploit and Lloyd George x *R. palmatus*.

Colchicine-induced tetraploids from hybrids between black currant varieties and nearly related *Ribes* species are being produced. Artificially-induced 4*n* forms of black currant are being intercrossed and back-crossed to produce variants differing in chromosome number.

Gooseberry varieties with much reduced spines but inferior in fruit size and quality, received from Canada, were crossed with Lancashire Lad. Field and laboratory experiments were carried out on frost resistance in tree and bush fruit varieties.

466 *Massee, A. M. VI. Entomology.* (*pp. 43–45*).

Apple seedlings showing resistance to woolly aphid have been obtained from crosses of Cox's Orange Pippin with Northern Spy x Majetin, Northern Spy x Laxton's Superb and Northern Spy x Malling I seedlings.

467 *Tydeman, H. M. A description of certain M.IX crosses.* (*pp. 86–88*).

Descriptions and illustrations are given of six new apple rootstocks selected from crosses of MIX with MVII, MXII, MXIII or MXVI. The rootstocks are numbered 3426, 3428, 3430, 3431, 3436 and 3438; they have not yet been released.

468 *Preston, A. P. Apple rootstock studies: the M.IX crosses.* (*pp. 89–94*).

The first results of field trials of rootstocks derived from crosses of MIX with other Malling rootstocks are summarized. The stocks referred to in the preceding abstract merit further study.

469 *Grubb, N. H. & Wood, C. A. Recent progress in raspberry breeding.* (*pp. 95–104*).

Information is given on the families used and their complex origins and on the individual selections.

470 *Ruxton, J. P. & Modlibowska, I. Preliminary studies on the resistance of raspberry varieties to spring frosts.* (*pp. 111–17*).

Raspberry varieties were tested in a special frost chamber, using either potted plants or racemes cut from plants growing in the field. None of the varieties exhibited marked resistance although some were less damaged than others. No exact proportional relationship was found between amount of frost damage and cropping of a variety.

471 *Garner, R. J. & Keep, E. A sport in the apple rootstock Malling XIII.* (*pp. 121–22*).

A sport with tetraploid roots arose from the vegetatively propagated 2*n* rootstock Malling XIII.

472 *Posnette, A. F. & Cropley, R. Distribution of rubbery wood virus in apple varieties and rootstocks.* (*pp. 150–53*).

A method of indexing apple trees for rubbery wood virus, using the variety Lord Lambourne as indicator, is described. Different degrees of rubberiness can be caused by virus variation. No virus was detected in the new Malling-Merton series of rootstocks or in stocks derived from MIX crosses. Many of the varieties maintained at the station were infected.

473 *Talboys, P. W. & Wilson, J. F. A method for determining the pathogenicity of strains of* Verticillium albo-atrum *isolated from the hop.* (*pp. 158–61*).

Artificial infection of hop plants grown in concrete tanks provided a satisfactory means of determining the pathogenicity of *V. albo-atrum* strains.

474 *Harris, R. V. Wilt-tolerant hops.* (*pp. 208–09*).

The prospects of five new wilt-tolerant seedlings as substitutes for the wilt-tolerant Wye varieties Keyworth's Midseason and Keyworth's Early are discussed. The two last-named hops have not proved acceptable to brewers as substitutes for wilt-sensitive varieties such as Fuggles. The five varieties are Bramling Cross (OT48) developed at Wye College, seedling 7147 released by Messrs. Whitbread, and seedlings C2, D1 and D3 bred at East Malling.

475 Kalmykov, S. S.
(Natural hybrids of fruit trees).
Sad i Ogorod (Gdn. & Veg. Gdn.) 1954 : No. 8 : 73–74. [Russian].

Pome fruits. Natural hybrids found in Kazahstan and of possible interest for breeding purposes are described. They include drought-resistant hybrids of the pear with *Pyrus heterophylla* and *P. regellii*.

Stone fruits. Mention is made of drought-resistant hybrids arising from natural crosses between *Prunus erythrocarpa* and myrobalan and of the hybrids *P. vavilovii* (*P. amygdalus* x *P. spinosissima*) and *P. amygdalus* x *P. persica*. Some late-maturing forms of *P. vavilovii* with sweet kernels and moderate soil and climatic requirements and of *P. amygdalus* x *P. persica* with fruit of good flavour and sweet kernels have been selected at the Bostandyk Field Research Station. *P. petunnikowii* is regarded as promising material for breeding hardy and late-flowering forms of *P. amygdalus*.

476 GRANHALL, I.
Berättelse över verksamheten vid Balsgård år 1953. (**Report on work at Balsgård, 1953**).
Fören. Växtföräd. Fruktträd 1953 (1954) : Pp. 22.

In August, 1953, the Balsgård Scandinavian Council for Plant Breeding was attended by representatives from Sweden, Norway, Denmark and Finland, and reports were read on work at Balsgård on breeding for resistance to apple scab, plum breeding and cold injury in apples and pears (cf. *PBA*, Vol. XXIV, Absts. 3262, 3280 and 3283).

The fruit collection at Balsgård has been increased by the addition of American and other varieties, including wild pears from Gotland for the production of stocks.

Work on the induction of mutations in pome, stone and other fruits by treatment with X rays, neutrons, γ rays, and radioactive cobalt and phosphorus has been continued in collaboration with Lund University and other research institutes working on genetic problems.

Apple. Hybridization work consisted largely in crossing Swedish varieties with scab-resistant apples from America. Pollen from some new, completely resistant American varieties, some of which had been obtained from crosses with the scab-resistant *Malus floribunda*, was used in pollinating varieties differing markedly in resistance. Though the germination capacity of the pollen was low owing to high temperature during transport, some seedlings were obtained which will undergo selection for resistance.

The Hans Mathiesen apple has been crossed with Oretorpsrenett [Oretorp Reinette], Kunglig Kortstjälk [Royal Short Stalk] and Old Nonpareil in an attempt to breed new late-flowering varieties that (1) are likely to be more frequently visited by bees than varieties flowering at the same time as the oil crops; and (2) will be less exposed to frost injury than early-flowering varieties.

Some of the best Balsgård tetraploids have been crossed with the American scab resistant diploids.

Self fertility studies of tetraploids have involved work on 37 types.

The root-stock breeding research has been described by Oldén (cf. *PBA*, Vol. XXIV, Abst. 3274).

Plum. Hybridization has been carried out to obtain (1) early, hardy varieties of good quality and (2) good sized varieties suitable for transport. The Persikeplommon [Peach plum] has been crossed with varieties of better quality, e.g. Hackman and Early Laxton; and Russian varieties have been extensively used to introduce hardiness into the progeny.

Diploid crosses of plums have been mainly between high-quality varieties and other hardy and earlier types better suited to the Swedish climate.

Pollen treated with colchicine *in vacuo* has been used in hybridization.

The embryo culture method, applied to early-ripening varieties, yielded 32% of viable seedlings.

New selections from the older plantings included Pr325 and Pr909 from Reine Claude d'Oullins x Victoria and Pr338 from Jefferson x Späths Früheste [Späth's Earliest].

Cherry. Early varieties are being crossed to obtain very early forms. It is hoped that a bigarreau of the Napoleon type and as resistant to bacterial disease as Frogmore will result from the combination Napoleon x Frogmore. In the sour cherry group, Vladimir 0–241 has been crossed with Ostheim, Montmorency and Brune de Bruxelles. A valuable new cherry Pr20789, derived from the variety Allmän Gulröd [Common Orange] under conditions of open pollination, seems to ripen only a few days later than Annonay and has orange-coloured fruits as large as those of Frogmore.

Various tetraploid sweet cherries have been crossed *inter se*, and colchicine-treated pollen has been used in hybridization work.

477 Jaarverslag 1951–1952. (**Annual Report for 1951-1952**).
Inst. Vered. TuinbGewass. 1954 : Pp. 151.

Beetroot. In trials conducted at various centres throughout the Netherlands, Early Wonder, Perfected Detroit, Non Plus Ultra, Granaat [Pomegranate] and Bleekblad [Pale-leaf] gave the highest yields.

Apple. Tetraploid forms of Cox's Orange and Jonathan have been obtained by colchicine treatment.

Pear. Data on yield, quality, maturity and resistance to disease are presented for 20 varieties of cooking pear cultivated in the Netherlands.

Plum. Two red-skinned mutants of Jefferson are reported.

Raspberry. Short descriptions of 19 new varieties undergoing trials at Wageningen are given. Breeding for resistance to *Amphorophora rubi* is continuing and crosses have been made between Batti's Perfection, Malling Landmark, Roodstekelige [Red-spined] and Superlative geel [Superlative yellow], all of which have

shown a considerable degree of resistance to this pest.

Strawberry. Several new varieties of European and American provenance at present undergoing trials at Wageningen are described. Clonal selection of a number of commercial Netherlands varieties has resulted in higher yields, improved fruit quality and increased resistance to diseases. Pollination studies on Jucunda showed that this variety gave higher yields when pollinated with the pollen of another variety.

Asparagus. The possibility of breeding andromonecious plants is examined (cf. *PBA*, Vol. XXIV, Abst. 694) and the value of vegetative propagation in perpetuating desirable genotypes is discussed.

Kale. Examination of 24 selections of the variety Westlandse indicated that coarse-leaved types gave higher yields and were more winter hardy than forms with fine leaves. The characters dark green leaf, highly curled leaf, tall plant habit and coarse leaves appeared to be linked.

Broccoli. Crosses are being made between Late van Verona [Verona Late] and Vroege van Angers [Angers Early] to combine good quality with early maturity.

Spinach. Several lines resistant to *Peronospora spinaceae* have been obtained (cf. *PBA*, Vol. XXIV, Abst. 1480).

Tomato. Commercial F_1 hybrids have been obtained from crosses among Ailsa Craig, Glorie, Radio, Westlandia, Bruinsma Jé Bé, Renova, Tuckqueen and Tuckswood.

478 Lewis, D. & Crowe, L. K.
Self-fertility in fruit trees. How it has been produced and its advantages.
Discovery 1954 : **15** : 371–74.

A popular account of the genetical causes of self sterility in fruit trees and of the use of X-ray-induced mutations to break down this sterility barrier is given.

479 Lewis, D. & Crowe, L. K.
The induction of self-fertility in tree fruits.
J. hort. Sci. 1954 : **29** : 220–25.

After pointing out the practical advantages of self-fertile varieties of plums and other fruits requiring cross pollination, the authors explain the X-irradiation method of inducing *S* mutations of the pollen which result in compatibility in hitherto incompatible self and cross matings. Pilot experiments on *Oenothera organensis* (cf. *PBA*, Vol. XVII, Abst. 10 and Vol. XIX, Abst. 64) provided a technique which has been successfully applied to sweet cherries, apples and pears. Large families of self-fertile seedlings can be raised from crosses in which induced self-fertile seedlings are used as ♂ parents; in sweet cherry, wholly self-fertile progenies have been obtained from crosses of the type S_3S_5 x S_3S_F, and progenies consisting of self-fertile and self-sterile trees in equal proportions have been produced by crosses of the type S_1S_2 x S_3S_F. Inbreeding has the advantage of producing homozygosity of useful recessive genes, such as those for very early ripening in one of the original self-fertile cherry mutants. Any loss of vigour due to continued inbreeding may be an advantage in developing dwarf varieties and rootstocks. Pear and apple seedlings from seeds produced by using X-irradiated pollen have still to be tested.

480 Yngve
Nytt från andra länder. (**News from other countries**).
Fruktodlaren 1954 : No. 4 : 120–21.

In an observation plot on the Knuthenborg estate (Denmark) five new apple varieties, selected for multiplication and sale, include: (1) the mutant Roger's McIntosh which differs from McIntosh by its uniform, fine red colour; its fruits are larger than the average and well shaped, with soft, juicy flesh with a delicate flavour; (2) Rød Melba [Red Melba] which, unlike its parent variety Melba, has shiny, crimson fruits with a slight bluish bloom and a piquant spicy flavour; the flesh is juicy and delicate; and (3) Rød australisk Jonathan [Red Australian Jonathan], which differs from the parent variety by its exceptionally vivid colour.

481 Johansson, E., Andersson, F., Lundstedt, H. & Bergelin, E.
Sort- och grundstamförsök med äpple vid Tosemarken och Ekerum 1941–1953. (**Variety and rootstock trials with apples at Tosemarken and Ekerum, 1941-53**).
Medd. Trädgårdsförs. Alnarp 1954 : No. 87 : Pp. 22.

Sort- och grundstamförsök med äpple. (**Variety and rootstock trials with apples**).
Försök o. Forskn. 1954 : **11** : 39–40.

Further results are recorded concerning the suitability of different apple varieties for various stocks tested at Tosemarken on the west coast of Sweden and at Ekerum on the island of Öland. Growth, yield, colour and quality of the fruits, resistance to diseases,

including *Gloeosporium album*, and absence of shrivelling during storage were among the criteria used in assessing the performance of the various combinations of variety and stock.

482 DE BRUYNE, A. S.
Het probleem der nieuwe appelrassen. (**The problem of new apple varieties**). Fruitteelt 1954 : **44** : 822–23.

Caution is advocated in the planting of varieties of foreign origin in the Netherlands until trials have shown them to be adapted to local conditions. The characteristics of a number of recent introductions from England, Australia and Denmark are subjected to a critical analysis and their failings pointed out. Stark Earliest, Laxton's Fortune and Taunton Cross would appear, however, to give good results under Netherlands conditions.

483 ZWINTZSCHER, M.
Über die Widerstandsfähigkeit von F'_2-Bastarden des Apfels gegenüber dem Schorferreger *Venturia inaequalis* (Cooke) Aderhold. [**On the resistance of F'_2 apple hybrids to the scab pathogen *V. inaequalis* (Cooke) Aderhold**]. Gartenbauwiss. 1954 : **1** : 22–35.

The techniques of hybridization and back-crossing to produce varieties resistant to scab are outlined and progress achieved in this field since 1946 by the Max Planck Institute for Breeding Research, Voldagsen, Germany, is described. The two resistant F_1 hybrids BIIb 7/34 (*Malus micromalus* x Charlamowsky) and BV 9/18 (*M. zumi*? x Landsberger Renette [Landsberg Reinette]) were back-crossed to cultivated varieties and the percentages of resistant plants determined. In controlled pollination experiments 30% of the progeny proved to be resistant and in open-pollination experiments 50–60%, the higher figure in the latter case being due possibly to a large percentage of crosses occurring between the two resistant hybrids instead of with the cultivated varieties. Resistance was due to hypersensitivity and was inherited as a dominant character. The possibility of polymeric inheritance of resistance is discussed with reference to the secondary polyploid nature of the genus *Malus*.

484 DRAIN, B. D. & SHUEY, G. A.
Breeding and testing fire blight-resistant pears.
Bull. Tenn. agric. Exp. Sta. 1954 : No. 236 : Pp. 20.

After a brief introduction in which the history of breeding blight-resistant varieties is surveyed and the question of suitable rootstocks discussed, data on the parentage, morphology, growth characters and fruit quality of the resistant varieties Dabney, Ayres, Mooers and Hoskins are given (cf. *PBA*, Vol. XXIV, Abst. 3291).

485 SINGH, U. P.
A note on hybridization technique in loquat (*Eriobotrya japonica* Lindl.).
Indian J. Hort. 1954 : **11** : 30–31.

Details are given of the method of emasculation, bagging and pollination found satisfactory at the Horticultural Research Station, Saharanpur, Uttar Pradesh.

486 CRESCIMANNO, F. G.
Contributo allo studio delle varietà di nespolo del Giappone coltivate in provincia di Palermo. (**A contribution to the study of the varieties of Japanese medlar cultivated in the province of Palermo**).
Riv. Ortoflorofruttic. ital. 1954 : **38** : 247–67.

Comments on the cultivation of *Eriobotrya japonica* in Palermo are accompanied by descriptions of the main morphological and physiological characteristics of 16 varieties, including Trabia, Marchetto, Pelosella and Ficarazzi, which are classed among the best.

487 VENJJAMINOV, A. N.
(**Apricots for the central belt**).
Priroda (Nature), Leningrad 1954 : No. 8 : 109–11. [Russian].

Varieties suitable for cultivation in central Russia were obtained at Voronež by a series of wide crosses involving European, central Asiatic and Irano-Caucasian varieties as the ♀ parent and Mičurin varieties or forms originating from Transbaïkal as the ♂ parents. The new varieties are resistant to a temperature of —40° C and produce large fruits of good flavour. The fruits of some varieties have a sweet kernel.

488 ČERNOVALOVA, V. N.
(**The plum Kora Olju from the Beškentskiĭ district**).
Sad i Ogorod (Gdn. & Veg. Gdn.) 1954 : No. 9 : p. 72. [Russian].

This local Uzbek variety is described as productive, drought resistant and tolerant of soil salinity. The quality and keeping properties of the fruit are good.

489 MURAWSKI, H.
Über vorläufige Versuchsergebnisse mit Müncheberger Pflaumenstammbildnern. (**On preliminary experimental results with Müncheberg plum stem-builders**).
Arch. Gartenb. 1954 : **2** : 222–35.

Among autotetraploid material of *Prunus*

cerasifera already discussed (cf. *PBA*, Vol. XXIV, Abst. 2382), a remarkably vigorous seedling, BIV, 19,13 is being tested for its possible value as a stem builder for plum trees. In view of the high incidence of polyploid forms in regions with extreme climates, changes in the physiological characteristics of polyploids might play an important role in adaptation to drought or cold. BIV, 19,13 seems to be cold resistant, a feature of great value, if combined with desirable stem-building qualities. The physiological characteristics of the new seedling and its effect on the growth and yield of the scion must be investigated.

490 Bagenal, N. B.
History and development of the cultivated fruits (Part III).
Rev. Ass. Agric. Lond. 1954 : No. 24 : 21–28.

A brief popular account of the origin and history of plums and greengages in England during and since the Middle Ages is given, together with information on the eating quality of the principal varieties grown at the present time (cf. *PBA*, Vol. XXIV, Absts. 2379 and 3288).

491 Schmidt, M.
Eine spätreife Sprossmutante der Kirschensorte "Königin Hortense." (**A late-maturing bud mutant of the cherry variety "Königin Hortense").**
Züchter 1954 : **24** : 215–16.

A bud mutation of Königin Hortense [Queen Hortense] discovered at the Erwin-Baur Institute, Müncheberg, Germany, is described. Its fruits mature some four to six weeks later than those of the parent tree, and the mutant may be of value as a late-maturing, high-quality, semisour cherry.

492 Pirovano, A. (Editor)
Le nuove pesche italiane. (**New Italian peaches**).
Ist. Frutticoltura e Elettrogenetica, Roma 1953 : Pp. 48.

This is a companion volume to the one dealing with grapes published in 1951 (cf. *PBA*, Vol. XXII, Abst. 2999). The peaches are treated on the same lines. Only varieties whose parentage is known are mentioned and these include peaches produced by C. Capucci, A. Morettini, A. Pieri and by the editor of the monograph himself. Each variety is illustrated by an excellent coloured plate.

493 **New variety of peach firm and bright under irrigation.**
Agric. Res., Wash. 1954 : **3** : No. 3 : p. 13.

Redglobe, a new peach developed by the US Department of Agriculture in cooperation with the Texas and Michigan Experiment Stations, is described as a high-yielding variety bearing fruit of good flavour and transportability. The fruit is medium to large with firm flesh and attractive colouring.

494 Lee, F. A., Oberle, G. & Whitcombe, J.
Chemical composition and freezing adaptability of peach varieties grown in western New York.
Bull. NY St. agric. Exp. Sta. 1954 : No. 768 : Pp. 13.

Of 59 varieties of yellow peach and 22 varieties of white peach examined at the New York State Agricultural Experiment Station, McAllister, J. H. Hale and Midway, among the yellow varieties, and Champion and Polly, among the white types, were found the most suitable for freezing purposes. No correlation between freezing quality and chemical composition was established.

495 Morettini, A.
I danni delle basse temperature del decorso inverno su alcune varietà di pesco. (**The damage by the low temperatures of last winter on some peach varieties**).
Riv. Ortoflorofruttic. ital. 1954 : **38** : 161–75.

Temperatures of −17° C occurred in the period 10–11 Jan. 1954 in northern Italy and data are given concerning damage caused to different varieties of peach growing in an experimental plantation. The least damaged were Guidobono and Lorenzino, and a number of Morettini's hybrids were classed as highly resistant; J. H. Hale was the least hardy of all.

496 Scrivani, P.
Patogenesi, riproduzione sperimentale del mal secco da *Deuterophoma tracheiphila* Petri e ricerche sulla formazione di metaboliti tossici in cultura. (**Pathogenesis, experimental reproduction of mal secco from *D. tracheiphila* Petri, and researches on the formation of toxic metabolites in culture**).
Phytopath. Z. 1954 : **22** : 83–108.

The degree of virulence of a series of Italian strains of the above fungus when inoculated into the bitter orange was investigated. All save one proved highly virulent.

497 Cameron, J. W., Baines, R. C. & Clarke, O. F.
Resistance of hybrid seedlings of the trifoliate orange to infestation by the citrus nematode.
Phytopathology 1954 : **44** : 456–58.

In investigations at the Citrus Experiment Station, Riverside, Calif., young seedling populations of *Poncirus trifoliata* and of hybrids between *P. trifoliata* and five species of *Citrus* were all highly resistant to the nematode *Tylenchulus semipenetrans*. Orchard trees of several older *Poncirus-Citrus* hybrids exhibited moderate to severe infestation, possibly because they differ genetically from the younger hybrids or because resistance decreases with age.

498 Crescimanno, F. G.
Il mandarino "Tardivo di Ciaculli." (**The mandarin Tardivo di Ciaculli**).
Riv. Ortoflorofruttic. ital. 1954 : **38** : 181–88.

The mandarin Tardivo di Ciaculli [Ciaculli Late] is thought to be a late-maturing bud sport of the popular Sicilian mandarin Avana di Palermo, to which it is preferred on account of its fruit quality as well as its later ripening; the fruits have a higher sugar content and a somewhat lower acid content.

499 Trevisan, M.
Studio comparativo sul valore alimentare delle cultivar di gelso "Florio" e "Nervosa" nell'allevamento del *Bombyx mori*. (**Comparative study of the food value of the mulberry cultivars Florio and Nervosa in raising *B. mori***).
Ann. Sper. agr. 1954 : **8** : 1401–14.

Descriptions are given of the two cultivars of *Morus alba* and of a hybrid thought to have originated from a cross of Nervosa with a local variety Comune [Common] from northern Italy. When the three forms were grown under identical conditions and fed to silkworms, the worms ate larger amounts of the variety Florio than of Nervosa and less still of the hybrid; the mortality was least in the worms fed on Florio, they were larger and produced the largest cocoons; the yield and quality of the silk was greater in the lots fed on Nervosa, whilst the hybrid was inferior in all respects.

500 Sambamurty, K. & Ramalingam, V.
Preliminary studies in blossom biology of the jack (*Artocarpus heterophyllus* Lam.) and pollination effects.
Indian J. Hort. 1954 : **11** : 24–29.

As the result of observations at Coimbatore, Madras, information is given on the development of the ♂ and ♀ inflorescences, anther dehiscence and stigma receptivity.

501 Singh, R. N.
Hybridization and mango improvement.
Indian J. Hort. 1954 : **11** : 16–18.

The possibility of obtaining improved varieties in India by interspecific hybridization and by crossing with suitable introductions of cultivated mango is discussed. Breeding so far undertaken in India is briefly surveyed, with particular reference to work at the Fruit Research Station, Saharanpur, Uttar Pradesh.

502 Nesterenko, G. A.
(**The uses of kaki fruits**).
Sad i Ogorod (Gdn. & Veg. Gdn.) 1954 : No. 8 : 46–48. [Russian].

Brief notes on varieties eaten fresh or grown for their dried products in the USSR include a reference to new forms combining high quality of fruit with good transportability. Some new varieties such as Uzbek and Denausskiĭ are adapted to the climatic and soil conditions of central Asia.

503 Cross, F. B., Hinrichs, H. A. & Thomson, H. J.
Hayes and Patrick pecans. New varieties for the cracking trade.
Bull. Okla. agric. Exp. Sta. 1954 : No. B–427 : Pp. 7.

The above new varieties, selected by the Oklahoma Agricultural Experiment Station, are described. Nuts from Hayes are medium in size, oblong to roundish in shape and have a thin shell. The kernel is plump, dark in colour and has a good flavour. Patrick produces a slender, elongated nut with a thin shell. The kernel is light in colour, smooth and plump. Both new varieties are highly resistant to scab, with mid-season maturity.

504 Clapper, R. B.
Chestnut breeding, techniques and results. I. Breeding material and pollination techniques. II. Inheritance of characters, breeding for vigor, and mutations.
J. Hered. 1954 : **45** : 107–14, 201–08.

A comprehensive survey of the progress achieved in the American chestnut breeding programme is presented. The principal object of the programme is to obtain trees combining the vigour and habit of *Castanea dentata* with resistance to *Endothia parasitica*, for which *C. mollissima* appears to provide the best source.

A large number of interspecific hybrids involving American and Far Eastern chestnut species have been obtained, and it appears that most interspecific combinations are readily effected. Self sterility however seems to be usual.
Resistance to *E. parasitica* is thought to depend on 2 pairs of genes. Early flowering is dominant to late. Time of nut drop is an hereditary character but displays no dominance. Nut size seems to be a quantitative character, small size being partially dominant. The everbearing habit of *C. seguinii* is dominant. Notes are given on the inheritance of nut-shell colour and nut flavour and of the mutant character cracked bark.
Some of the blight-resistant F_1 hybrids of *C. dentata* x *C. mollissima* appear promising for planting as timber trees.

505 Biraghi, A.
Ulteriori notizie sulla resistenza di *Castanea sativa* Mill. nei confronti di *Endothia parasitica* (Murr.) And. [**Further notes on resistance of *C. sativa* Mill. to *E. parasitica* (Murr.) And.**].
Boll. Staz. Pat. veg. Roma 1953 (1954) : **11** : 149–57.

Further support, based on observations in various parts of Italy, has now been obtained for the writer's view that active resistance of *C. sativa* to canker is due to increased cambium activity (cf. *PBA*, Vol. XXII, Abst. 2977). This reaction, readily observable by histological examination, can also be seen in *C. mollissima* and *C. crenata* after artificial inoculation with *E. parasitica*.

506 **Chestnut blight and resistant chestnuts.**
Fmrs' Bull. Dep. Agric. Wash. 1954 : No. 2068 : Pp. 21.

An account of the spread of chestnut blight through the USA from 1910 to 1950 and of the introduction of the resistant Chinese chestnut is given. No variety of American chestnut has proved in the least resistant but resistant forms similar in growth habit and quality to the native American types have been obtained by the US Department of Agriculture by crossing hybrids between American and Japanese forms with Chinese types and by back-crossing hybrids between American and Chinese species to the Chinese parent. Resistance to the fungus was found to depend upon the type of tannin present in the bark.

507 Sauer, G. & Widjanarko, S.
Historische ontwikkeling van de Arachiscultuur. (**Historical development of *Arachis* cultivation**).
Landbouw, Bogor 1953 : **25** : 255–64.

An historical account of groundnut cultivation in Indonesia since the introduction of varieties of the runner type by early Portuguese and Spanish traders in the sixteenth century is presented. The characteristics of varieties at present cultivated are described, the conclusion being drawn that these varieties are chiefly the products of natural hybridization between the earlier runner-type strains and erect varieties introduced in the nineteenth century.

508 Tang, W. -T. & Chiang, S. -M.
(**Investigations on the dormancy of groundnut seeds and on breaking their dormancy**).
Taiwan Tangyeh Chikan/Taiwan Sug. J. Quart. 1953 : **4** : No. 4 : 390–97. [Chinese].

A series of large-seeded varieties showed dormancy periods ranging from 55 to 75 days. The large-seeded variety Chua-wa-ta-li 1 [Java Large-seeded 1] had no dormancy period, nor did any of the 9 small-seeded varieties examined.

509 Sauer, G.
Selectie van de aardnoot (*Arachis hypogaea* L.) op ziekteresistentie. [**Breeding the groundnut (*A. hypogaea* L.) for disease resistance**].
Landbouw, Bogor 1953 : **25** : 265–83.

This survey of the literature on breeding for resistance to *Cercospora personata, C. arachidicola* and rosette virus includes an account of damage caused by these diseases in Indonesia and of selection work in progress at the Agricultural Research Institute, Bogor. No resistant strain has been evolved as yet.

510 Sauer, G.
Nabeschouwingen over de aardnootvariëteit Schwarz 21. (**Afterthoughts on the groundnut variety Schwarz 21**).
Landbouw, Bogor 1953 : **25** : 284–90.

The Agricultural Research Station, Bogor, reports that Schwarz 21, the most widely cultivated variety in Indonesia for the past 20 years, is to be replaced by the new variety Gadjah [Elephant]. The resistance of Schwarz 21 to bacterial wilt has diminished as a result of natural hybridization and it is now not only less resistant to wilt than Gadjah but also gives

lower yields than Gadjah on soils of high fertility. On soils of low fertility, Schwarz 21 and Gadjah produce approximately the same yields.

511 Evans, A. C.
Rosette disease of groundnuts.
Nature, Lond. 1954 : **173** : 1242–43.

The paper includes information on the nature of the resistance of the mixed variety Mwitunde to rosette virus (cf. *PBA*, Vol. XXIV, Abst. 2418). Initial infestation of Mwitunde is similar to that of other groundnuts. A suitably large population of predators exterminates a higher percentage of the aphid colonies on Mwitunde because of the lower rate of reproduction on this variety. Percentages of aphids able to transmit rosette were lower when the vectors were reared on Mwitunde than on Natal Common. Evidence has been obtained suggesting that Mwitunde possesses some tolerance of the virus. The seed dormancy of Mwitunde is valuable in rosette control. It may be possible to select a higher yielding and more field-resistant strain from Mwitunde.

512 Zuñiga, L. C.
The probable inheritance of the makapuno character of coconut.
Philipp. Agric. 1953 : **36** : 402–13.

The makapuno type is characterized by a soft but firm endosperm almost filling the interior of the nut. Normal trees and those bearing some makapuno nuts were not found to differ in floral structure or blooming and fruiting habits; the embryo of the makapuno type is apparently normal. Data on the immediate production of normal and makapuno nuts upon self pollination or intercrossing of makapuno-bearing trees and upon reciprocally crossing normal and makapuno-bearing trees suggest that the makapuno condition is recessive to the normal and depends upon a single gene, trees occasionally bearing makapuno nuts being heterozygous.

513 Alexander, D. B. W.
A method of pollinating dates.
Rep. Date Gr. Inst. Coachella 1952 : **29** : p. 20.

A device for pollinating dates from the ground is described. It consists of a jar containing pollen to which 20 ft. of $\frac{1}{8}$-in. copper tubing, supported by a 1-in. aluminium pipe, is connected. The pollen can then be blown up the copper tubing by means of a subsidiary pipe attached to the jar.

514 García Cabezón, A.
El cultivo del olivo en la Argentina. (**The cultivation of the olive in Argentina**).
Agricultura, Madrid 1954 : **23** : No. 266 : 328–31.

A description of the agronomic characters and origin of the major Argentine varieties is included.

515 Di Prima, S.
La metodologia bio-statistica nella classificazione delle varietà con particolare riferimento all'olivo. (**Biostatistical methodology in the classification of varieties, with particular reference to the olive**).
Ann. Sper. agr. 1954 : **8** : No. 4 : xvii–xxxi.

The method described consists in making a varietal index based on weighted mean values for a number of characters such as length and breadth of the stone, leaf and rachis and their ratios; the values and the indices are reported for 108 varieties of Italian olives.

516 Francesconi, F.
Una razza umbra di olivo resistente al freddo: la "Nostrale di Rigali." (**An Umbrian olive variety resistant to cold: Nostrale di Rigali**).
Ann. Sper. agr. 1954 : **8** : 1103–16.

A full description is given of this olive, remarkable for its capacity to survive in one of the most inclement situations where olives grow in Italy. It is resistant to a number of diseases as well as to cold and gives a moderate yield of fruit every year; it is distinguished by the high oil content of its fruits and by the high quality of the oil. The variety is self sterile.

517 Malan, E. F. & van der Meulen, A.
Avocado culture in South Africa.
Fmg. in S. Afr. 1954 : **29** : 309–15.

This account of the cultivation of avocados in South Africa includes brief notes on the yield, maturity, quality of fruit and susceptibility to diseases and insect pests of the principal varieties cultivated in the Union. Three groups, representing varieties of Mexican, Guatemalan and West Indian origin, respectively, are distinguished. Fuerte, Itzamna, Nabal, Hass, Ryan and Edranol are the varieties most suited to South African conditions.

518 Popenoe, W.
Toltec, another new horticultural variety of avocado.
Ceiba 1951 : **1** : 225–27.

A description is given of the above seedling,

which is one of the avocado varieties found growing in the Rodiles grove in Atlixco, Puebla, Mexico. Toltec is recommended on account of its large crop and glossy green and relatively small fruits; the seeds are rather large.

519 Resistenzzüchtung bei Obst. c) Beerenobst. (**Breeding for resistance in fruit: c) berry fruits**).
Saatgutwirtschaft 1954 : **6** : p. 206.

A general account of breeding for disease resistance in strawberry, raspberry, blackberry, gooseberry and black and red currants is given. In the case of the raspberry and blackberry, American varieties may provide useful material for breeding for resistance to *Didymella applanata* and *Leptosphaeria coniothyrium*, while the American varieties Philadelphia and Eldorado should prove useful for breeding for frost resistance in German blackberries. *Sphaerotheca mors-uvae* is the most serious disease attacking the gooseberry; American varieties resistant to the fungus have been developed. Leaf-shedding in black and red currants may be combated by crossing susceptible varieties with strains containing genes derived from *Ribes alpinum*.

520 Slate, G. L.
New raspberry varieties.
Bull. NY St. agric. Exp. Sta. 1954 : No. 763 : Pp. 4.

Details of September and Amber have already appeared in *PBA*, Vol. XVIII, Abst. 1204 and Vol. XXI, Abst. 2134, respectively. Milton, a selection from Lloyd George x Newburgh, is resistant to mosaic and frost, grows vigorously and gives satisfactory yields of good quality berries which ripen later than those of other varieties cultivated at Geneva.

521 Haskell, G.
The history and genetics of the raspberry.
Discovery 1954 : **15** : 241–46.

The early history of the raspberry in Britain and North America, the problem of virus degeneration, genetical characters, varieties and breeding, and the relationship between polyploidy and autumn fruiting are concisely surveyed in a popular but informative manner.

522 Blommers, J.
Frambozenrassenproef in de Bommelerwaard. (**Raspberry variety trials in the Bommelerwaard**).
Fruitteelt 1954 : **44** : p. 827.

In trials in 1954 of nine varieties in the Bommelerwaard district of the Netherlands, Malling Exploit gave the highest yields.

523 Sergeeva, K. D.
(**Altaĭ varieties of black currant at Mičurinsk**).
Sad i Ogorod (Gdn. & Veg. Gdn.) 1954 : No. 6 : 53–55. [Russian].

At the Altaĭ research station, hardy varieties with good quality fruits were obtained by crossing Siberian forms with European varieties. In recent trials at Mičurinsk, the new strains bore larger fruits and produced higher yields than the European varieties. Nadežda [Hope] and Desertnaja Altaja [Altaĭ Dessert] are notable for their large fruits and Golubka [Little Dove] and Stahanovka Altaja [Altaĭ Stahanovite] for their productiveness. The latter had the highest vitamin C content.

524 Sergeeva, K. D.
(**New gooseberry varieties**).
Priroda (Nature), Leningrad 1954 : No. 9 : 100–02. [Russian].

Large-fruited varieties possessing resistance to *Sphaerotheca* have been developed at Mičurinsk. They include Russkiĭ [Russian], Pioner [Pioneer] and Severnyĭ Vinograd [Northern Vine], obtained by pollinating Careless with mixed pollen from *Sphaerotheca*-resistant varieties, and the hybrids Malahit [Malachite] from Černyĭ Negus [Black Negus] x Finik [Date], Plodorodnyĭ [Prolific] from Oregon x Finik, and Desertnyĭ [Dessert] from English Yellow x Štambovyĭ. Further hybrids with improved quality of fruit have been obtained by pollinating the above new varieties with mixed pollen.

525 Baker, G. A. & Baker, R. E.
Strawberry uniformity yield trials.
Biometrics 1953 : **9** : 412–21.

Two trials are described. The F values for several designs with random assignment of varieties, and the correlations between neighbouring plants, are discussed.

526 Une nouvelle variété de fraises, la Senga-Sengana. (**A new variety of strawberries, Senga-Sengana**).
Courr. hort. 1954 : **16** : p. 426.

A fuller account is provided of the origin and characteristics of this new strawberry, already mentioned in *PBA*, Vol. XXIV, Abst. 3348.

527 Kobel, F. & Schütz, F.
Eine neue Erdbeersorte der Eidg. Versuchsanstalt Wädenswil. (**A new strawberry variety of the Wädenswil Federal Research Station**).
Obst Weinb. 1954 : **63** : 343–44.

The new garden variety Wädenswil 5 is described as high yielding with shining, scarlet, juicy fruits, varying in size from medium to large and

having a refreshing acid flavour, a delicate aroma and a fairly high sugar content. The variety is not suitable for large scale cultivation for preserving, nor for commercial purposes as it does not stand transport very well. It was bred from a cross of Wädenswil 3, a derivative of Hansa, Deutsch Ewern [German Evern] and Osterfee [Easter Fairy], with 31/179, whose ancestry included the crosses Leopoldshall x Hansa, Roter Elephant [Red Elephant] x Deutsch Ewern and Sieger [Victor] x Osterfee.

528 Slate, G. L.
New strawberry varieties.
Bull. NY St. agric. Exp. Sta. 1954 : No. 762 : Pp. 7.

Details of the new varieties Empire, Erie and Essex have already appeared in *PBA*, Vol. XXII, Abst. 1420. Eden, a selection from Dresden x Fairfax, grows vigorously and bears heavy yields of firm, red-fleshed berries of an attractive appearance and tart flavour. It is suitable for canning and freezing but too acid for use as a dessert variety. Dresden (Beacon x Howard) is a high-yielding early-maturing dessert variety with large, smooth berries and tough skin. It has proved useful for breeding purposes, transmitting its productiveness and freedom from end-season sterility to many of its seedlings.

529 Brooks, A. N.
Florida Ninety strawberry after one year in commercial production.
Proc. Fla. hort. Soc. 1953 : **66** : 109–11.

Florida Ninety, a new strawberry variety developed by the Florida Agricultural Experiment Station, is described. It was derived from a chance cross between Missionary and an unknown pollinator and gives high yields of large-sized, bright-red fruits of good quality. The new variety is highly resistant to leaf spot and matures slightly later than Missionary.

530 Mannevik-jordbærene lager sensasjon. (**Mannevik strawberries make a sensation**).
Bondevennen 1954 : **57** : 469–70.

Jordbærsorten "Mannevik." (**The strawberry variety Mannevik**).
Ibid. 1954 : **57** : 489–90.

The first paper acquaints Norwegian readers with the claims made for this Swedish strawberry (cf. *PBA*, Vol. XXIII, Abst. 2976) and its reception among growers in Sweden and Norway.
In the second article, a Norwegian correspondent, writing from Vollebekk, discusses the identity of the variety and suggests that judgment on its merits should be reserved until official tests of Mannevik have been carried out in Norway and its performance in comparative variety trials in different localities assessed.

531 Barnes, B.
Strawberries: cultivated and wild.
Discovery 1954 : **15** : 325–29.

A popular account is given of the history of different strawberry species, of the origin of the garden strawberry from chance crossing between *Fragaria virginiana* and *F. chiloensis* at Brest at the beginning of the eighteenth century, and of the development of the earliest cultivated varieties, notably Laxton's Royal Sovereign.

532 Kluge, K.
Untersuchungen zur Züchtung polyploider Monatserdbeeren. (**Investigations on breeding polyploid everbearing strawberries**).
Arch. Gartenb. 1954 : **2** : 201–06.

Tetraploid forms of *Fragaria vesca* 'Rügen' were obtained by colchicine treatment and compared with the diploid with reference to habit, shape of leaf, dimensions of the leaf stomata and epidermal cells. The tetraploid differed markedly in all these respects from the diploid.

533 Falch, J. & Strauss, E.
Prüfung verschiedener Ananaserdbeersorten für die Gefrierkonservierung. (**Test of several varieties of pineapple strawberry for freeze preserving**).
Mitt. Klosterneuburg, 1954 : Ser. B :**4** : 148–52.

Data on suitability for freezing and ascorbic acid content are presented for eleven varieties of pineapple strawberry. Tests at the Klosterneuburg Experiment Station, Austria, in 1953 indicated that Georg Soltwedel, Mieze Schindler, Wädenswil 4, Ananas [Pineapple] and Hansa [Hanseatic] were the most suitable varieties for freezing.

534 Zotova, Z. S.
(**Moscow varieties of strawberry in the Altaĭ**).
Sad i Ogorod (Gdn. & Veg. Gdn.) 1954 : No. 6 : 52–53. [Russian].

Komsomolka [Komsomol], Pionerka [Pioneer] and Krasavica Zagorjja [Ultramontane Beauty] outyielded other Moscow-bred varieties and the local standards in recent trials in the Altaĭ. Komsomolka has shown resistance to pests and fungi.

535 Voronova, T. G.
(Strawberry varieties in Sahalin).
Sad i Ogorod (Gdn. & Veg. Gdn.) 1954 : No. 6 : 48–51. [Russian].

Descriptions are given of several strawberries, including two perpetual varieties, which have been selected on the basis of their high yields and good fruit quality in Sahalin. All the varieties which did well in the trials were local forms, with the exception of Daljnevostočnaja [Far-Eastern]. This latter variety is resistant to pests and diseases and has originated from the Far-Eastern branch station of the Institute of Plant Industry.

536 Duka, S. H.
(The new early variety of strawberry Kievskaja Rannjaja 2).
Agrobiologija (Agrobiology) 1954 : No. 3 : 134–36. [Russian].

Kievskaja Rannjaja 2 [Early Kiev 2] has been bred from Culver x Kievskaja Rannjaja, the pollen-bearing parent being a hybrid of Sejanec Kressenta with Roščinskaja. It is described as hardy, drought-resistant and productive. The fruits are larger and of better quality than those of Koralka [Coral] and ripen 6–8 days earlier than those of Roščinskaja.

537 Čuev, V. V.
(Élite seedlings of strawberry promising for the Murmansk province).
Agrobiologija (Agrobiology) 1954 : No. 3 : 131–34. [Russian].

Strawberries adapted to outdoor cultivation in the Kola peninsula have been developed from seed originating in the Vologda province. Seedlings 1, 2, 3 and 4, selected on the basis of their fruit quality, yield and resistance to fungi, are briefly described. Most of them have perfect flowers.

538 Simmonds, N. W.
Isolation in *Musa*, sections *Eumusa* and *Rhodochlamys*.
Evolution, NY 1954 : **8** : 65–74.

Investigations were carried out on the 28 possible hybrid combinations among *M. acuminata, M. balbisiana, M. basjoo* and *M. itinerans* of sect. *Eumusa* and *M. laterita, M. ornata, M. sanguinea* and *M. velutina* of sect. *Rhodochlamys*. The geographical distributions of the components of the different hybrids are compared and the crossability, viability, cytology, fertility and breeding behaviour of the F_1 hybrids are described. The species exhibit a fairly wide range of modes of isolation, resulting from geographical separation, inviability of the hybrid zygotes at various stages of development, F_1 sterility and meiotic breakdown. No evidence has so far been obtained of ecological isolation, barriers to pollination or fertilization, or of F_2 genetic breakdown. Isolation is apparently complete except between (1) *M. ornata* and *M. velutina* and (2) *M. sanguinea* and *M. velutina*. The Assam-Burma region is regarded as the centre of diversity of the 22-chromosome species composing both sections. Reproductive isolation between species within one section is comparable in magnitude with that between species belonging to different sections. Relationships are postulated for the eight species studied. Taxonomic classification does not necessarily indicate genetic relationship, e.g. *M. acuminata* is more nearly related to *M. laterita* than to *M. basjoo*. Sect. *Eumusa* is more highly differentiated than sect. *Rhodochlamys* and is thought to be the older group.

539 Cosmo, I. & Polsinelli, M.
"Tocai Friulano." **(Friuli Tocai).**
Ann. Sper. agr. 1954 : **8** : No. 5 : Suppl. lxxi–lxxxiii.

The identity and origin of the vine known by this name in the northern provinces of Italy are discussed. In morphological characters it resembles Sauvignon and the features which distinguish it from that variety are pointed out in a full description.

540 Cosmo, I., Comuzzi, A. & De Bastiani, D.
Indagini sulla ricostituzione viticola delle Venezie ai fini dell'orientamento per i futuri impianti. Risultati della sperimentazione compiuta sui vitigni da vino in provincia di Treviso a decorrere dal 1922. 1° Contributo: Zona del Raboso Piave. **(Investigations on the viticultural reconstruction of the Venetian provinces with the object of providing guidance for future planting. Results of experiments carried out on wine grapes in the province of Treviso from 1922 onwards. 1. Zone of the Raboso Piave vine).**
Annu. Staz. Sper. Vitic. Conegliano 1952–53 : **15** : No. 17 : Pp. 142.

Cosmo, I., Polsinelli, M., Titton, A. & Sanzuol, N.
2° Contributo: Zona di Conegliano-Valdobbiadene. **(2. Zone of Conegliano-Valdobbiadene).**
Ibid. 1952–53 : **15** : No. 18 : Pp. 198.

Since its foundation in 1923 the Stazione

Sperimentale di Viticoltura [Viticulture Experiment Station] at Conegliano in northern Italy has carried out observations on a number of varieties of wine and dessert grapes and of rootstocks with the object of determining the most suitable of each for planting new vineyards or reconstituting old ones in the Venetian provinces; the results of the observations on direct-producer hybrids have been published (cf. *PBA*, Vol. XVII, Abst. 1313). The data on wine varieties are now presented, and comprise details concerning vegetative vigour, yield, sugar and acid contents and reaction to given rootstocks. The results for different zones are presented separately; the first part is concerned with the zone on the left bank of the river Piave where the predominant vine has been the Raboso Piave, which is losing its popularity on account of its excessive acidity. The conclusions reached from the study of five different experimental vineyards are that suitable substitutes for Raboso Piave can be found in the vines Raboso Veronese, Merlot and Cabernet franc, which are just as vigorous but mature earlier, are all lower in acidity and the last two also sweeter; the best wines are produced from a mixture of Raboso Veronese and Merlot or from Cabernet franc alone; among the white varieties, Tocai friulano and Malvasia istriano are recommended.

The second part gives similar information for a zone lying between the towns of Valdobbiadene and Conegliano, famed for its white grapes and wine, based mainly on the varieties Verdiso and Prosecco. The observations have shown that no white variety is worthy of replacing these two, with the possible exception of Riesling italico and some clonal selections of Prosecco. However, certain red varieties are recommended for growing in addition to the white; these are Cabernet franc and possibly also a mixture of Merlot, Malbeck and Barbera. For rootstocks, Berlandieri x Riparia hybrids 420A and Kober 5BB and Rip.-Cord.-Rup. 106.8 are recommended.

541 Cosmo, I.
Contributi al miglioramento della vite.
(Contributions to vine improvement).
Annu. Staz. Sper. Vitic. Conegliano 1950–51 : **14** : No. 11 : Pp. 22; also Atti Accad. ital. Vite Vino 1950 : Pt. 2.

Selection is now being made among a large number of hybrids from the Friulian vine Piccolit, the forms which produce wine most closely resembling that of the original Piccolit being retained; the hybrids Piccolit x Verduzzo 60, Piccolit x Pinot Blanc 50 and Piccolit x Pinot Blanc 52 were adjudged the best.

Among Dalmasso's dessert-grape hybrids favourable mention is accorded to VI.6 (Bicane x Regina), which excels Bicane in the quality and yield of its fruit; III/33 (Muscat d'Hambourg x Regina), which combines the colour of the former parent with the fruit shape of the latter and is distinguished by high yield and keeping capacity of the fruit; VI/24 (Bicane x Moscato Terracina), which is distinguished by vigour, yield and good fruit colour; XVIII/3 (Muscat d'Hambourg x Pirovano 62), which is extremely vigorous and prolific; and IV/I (Frankenthal x Zibibbo), also outstanding in vigour and fertility.

Clonal selection is being practised in a number of established varieties to reduce the incidence of sterility or defective setting; in this way it has been possible to raise the yield of Riesling renano [Rhenish Riesling] from 67.50 to 115 q. per ha. and that of Cabernet Sauvignon from 48·3 to 104·5 q. per ha. Clonal selection has been carried out in the rootstock variety Berl.-Riparia Teleki 8 which proved very mixed; two selections have shown superiority in growth rate, ease of reproduction, adaptation to the climate of northern Italy and affinity with the vine varieties of the area.

542 Kuzjmin, A. Ja.
(Breeding vines).
Agrobiologija (Agrobiology) 1954 : No. 3 : 82–93. [Russian].

Tambovskiĭ Rozovyĭ [Tambov Pink] from Malingre Seedling x 135, Tambovskiĭ Zelenyĭ [Tambov Green] from Čuaš x Early Malingre and Nagrada [Reward] from Russian Concord x White Ezandari have been developed at Mičurinsk. They are described as hardy, vigorous, productive and early varieties with perfect flowers, well-formed bunches and grapes of good flavour. All the above hybrids are self fertile but Tambovskiĭ Zelenyĭ gives better yields when open-pollinated.

543 Dermen, H.
Colchiploidy in grapes.
J. Hered. 1954 : **45** : 159–72.

Tetraploid strains of 10 bunch varieties and 12 muscadine forms have been obtained by the application of colchicine to the buds of cuttings. An increase in berry size characterized most of the tetraploids. In the case of the muscadine varieties, the tetraploid strains have a U-shaped cordate leaf base in contrast to the angular cordate leaf base of the corresponding diploids.

544 Capucci, C.
La vite Maligia, osservazioni e ricerche. (**The Maligia vine, observations and investigations**).
Riv. Fruttic. 1954 : **16** : 81–111.

In addition to information on the history and synonyms of this Italian vine, its morphological and biological characteristics are described in accordance with the criteria adopted in the International Ampelographical Classification. Studies of the variety in Italian vineyards have shown it to be vigorous, productive and hardy and also a fast grower that gives a wine of good quality, in spite of the unattractive appearance of the bunches.

545 Dalmasso, G.
Per un'ampelografia dei principali vitigni ad uve da vino coltivate in Italia. (**An inventory of the principal wine-grape vines cultivated in Italy**).
Ann. Sper. agr. 1954 : **8** : No. 5 : Suppl. lxiii–lxx.

The work of a commission set up in 1952 to make a study of all the main grape vines cultivated in Italy is described; a permanent collection comprising all the clones described is part of the scheme. The descriptions, which are being prepared in accordance with the international rules (cf. *PBA*, Vol. XXIII, Abst. 1477) are being published in the *Annali della Sperimentazione Agraria.*

546 Turkovic, Z.
Vitis silvestris Gmelin scoperte in Jugoslavia. (***V. silvestris* Gmelin discovered in Yugoslavia**).
Riv. Vitic. 1954 : **7** : 139–46.

A description is given of the wild vines of Herzegovina, which are all diecious and display great resistance to drought and poor soil conditions, though they are not resistant to mildew.

547 Ogienko, G. & Haĭdarkulov, G.
(**Local vine varieties from the Tagob valley**).
Sad i Ogorod (Gdn. & Veg. Gdn.) 1954 : No. 6 : 71–72. [Russian].

Local Uzbek varieties, some of which are used for making wine or manufacturing raisins, are described. Kara Sultani, thought to be derived from the cross Kara Vassarga x Kišmiš Černyĭ [Black Raisin], is considered the best dessert variety of black grape in the region. Kišmiš Ljunda, Kišmiš Vatkana and Kišmiš Uzumbašly are seedless varieties.

548 Pirovano, A.
Sulla resistenza alla fillossera della *Vitis vinifera.* (**The phylloxera resistance of *V. vinifera***).
Riv. Vitic. 1954 : **7** : 211–14.

The author recalls the production of his Hybrid 17 from a cross of Greco bianco [White Greek] x Precoce d'Ischia [Ischia Early] in 1903. The hybrid was early and vigorous and possessed a certain degree of resistance to phylloxera. From 16 seedlings of the hybrid, 4 proved resistant to phylloxera; all bore very small fruits and bunches but might, it is suggested, be of use as rootstocks for certain vines which do not thrive on resistant American stocks.

549 Henniger, H.
Untersuchungen zur Entwicklung und Variabilität von *Pseudopeziza tracheiphila* Müller-Thurgau. (**Investigations on the development and variability of *Ps. tracheiphila* Müller-Thurgau**).
Phytopath. Z. 1954 : **22** : 1–34.

In the course of a general study of the above fungus, the author discovered that the species consisted of a large number of strains differing in their morphological and physiological characteristics. Geographical races could not, however, be distinguished.

FORESTRY

550 Stern, K.
Ein Modell für die Wechselwirkungen des Wachstums. (**A model for growth interactions**).
Züchter 1954 : **24** : 216–20.

A mathematical analysis of the ways in which growth rate depends on environmental yield-factors, time and genetic constitution is presented, with special reference to the problem of comparative trials of forest tree strains.

Sukačev, V. N. & Pravdin, L. F. (Editors)
(**Breeding forest trees and seed growing in forestry**).
Trud. Inst. Lesa [Trans. Inst. For.] 1951 : **8** : Pp. 205.

This symposium consists of papers read at a Mičurinite conference, held in January 1950 at the USSR Forestry Institute. The report by L. F. Pravdin formed the basis of the discussion.

551 *Pravdin, L. F.* (*The present position of forest tree breeding and seed growing and methods of improving it*). (*pp. 5–35*).

The breeding of forest trees in the USSR during the last 20 years is surveyed. Research is said to have been obstructed by formal genetics and

by the slow introduction of Mičurinite methods into forestry. Many important economic forms obtained by selection or vegetative and sexual hybridization are listed.

Deciduous trees. New forms include interspecific hybrids of willow possessing improved quality of the withes; oaks, maples and poplars notable for their high rate of growth, good timber quality and hardiness; birches and a giant aspen showing resistance to salinity; and a specimen of *Euonymus* with a high content of gutta percha.

Conifers. Spruces and larches showing good growth in girth and height and pines resistant to drought and salinity have been developed.

552 *Obnovlenskiĭ, V. M.* (*Geographical variability of forest trees and its uses in breeding and seed growing in forestry research*). ((*pp. 36–57*).

Data on intraspecific variability of some conifers and deciduous trees in the European part of the USSR are presented and Mičurinite methods of employing variability in breeding are outlined.

553 *Aljbenskiĭ, A. V.* (*Sexual hybridization methods for forest trees*). (*pp. 58–62*).

The principles of Mičurinite genetics, vegetative hybridization and the use of vegetative rapprochement and mentors are set forth.

554 *Pjatnickiĭ, S. S.* (*Results of breeding research with oaks*). (*pp. 63–71*).

New forms of oak obtained at Harjkov in recent years include several interspecific hybrids of *Quercus macranthera* interesting for their drought resistance, high rate of growth and good increase in diameter. Some interspecific hybrids of *Q. suber* proved hardy, but their value for producing cork is still unknown.

555 *Bogdanov, P. L.* (*Results of breeding research with poplars in Leningrad*). (*pp. 72–77*).

Several hardy and quick-growing forms of poplar have been obtained by interspecific sexual and vegetative hybridization. The vegetative hybrids are described as resistant to some pests and fungi, besides being hardy and showing a high rate of growth. It is admitted that the breeding methods, which included irradiation, were unsatisfactory from the Mičurinite standpoint.

556 *Žurbin, A. I.* (*Breeding new poplar hybrids*). (*pp. 78–84*).

Interspecific hybrids bred recently at the Ukrainian Forestry Institute include a drought-resistant hybrid of *Populus pyramidalis* x *P. trichocarpa* and a quick-growing hybrid of *P. tremula* x *P. alba*. Complete or partial incompatibility between some species, for instance between *P. pyramidalis* and *P. lasiocarpa*, has been overcome by standard Mičurinite methods or by keeping a branch of the female parent for some days in a cool dark room before attempting pollination.

557 *Žurbin, A. I.* (*Overcoming incompatibility between* Populus *species by means of darkness and low temperature*). (*pp. 85–87*).

The method referred to in the preceding paper is described in detail.

558 *Aljbenskiĭ, A. V.* (*Results of hybridization of larch, maple, elm and ash trees*). (*pp. 88–94*).

Larch. In Moscow, interspecific crosses involving either the European or Siberian larch as a female parent have given vigorous and hardy hybrids.

Maple. At Kamyšin, several interspecific hybrids proved hardy and drought-resistant.

Elm. At Kamyšin F_1 hybrids of *Ulmus pinnatoramosa* with *U. laevis* or *U. pliacea** proved fertile and were greater in diameter and height than the parent species. No segregation occurred in the F_2.

Ash. A few fertile interspecific hybrids have been obtained by pollinating young trees with pollen mixtures.

559 *Ščepotjev, F. L.* (*Breeding methods for developing winter hardy forms of walnut*). (*pp. 95–114*).

The hardiness of *Juglans regia* forms from the Kirovograd province has been improved by extensive selection of seedlings. Hardy élite plants are being tested in the colder districts of the Ukraine. Some F_2 hybrids of *J. nigra* x *J. regia* possessing the morphological characters of the paternal parent have been obtained.

560 *Ozol, A. M.* (*Initial seed selection and a method of training young seedlings*). (*pp. 115–24*).

Some forms of walnut originating from the Ukraine, central Asia and the Caucasus proved hardy under Moscow conditions. Agrobiological methods for preventing frost damage are described.

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*? *U. foliacea.*

561 *Zarubin, A. F.* (*Breeding late-flowering forms of the walnut*). (*pp. 125–27*).

A brief account of investigations of wild walnuts in the Kirgiz SSR is given. Mention is made of material selected for large kernels, thin shells and high oil content. Breeding aims include the development of forms with a short growth period. It is thought that it may be possible to select forms with a growth period of 110 days from walnuts borne on some trees which flower twice a year.

562 *Sokolov, N. O.* (*The results of a study of the Karelian birch*). (*pp. 128–31*).

Morphological and biological properties of this variety of *Betula verrucosa* have been studied.

563 *Rovskiĭ, V. M.* (*Breeding forest trees in Uzbekistan*). (*pp. 132–51*).

Walnut. Many forms selected from wild local material for high yield, large kernels and low husk and high oil contents are described. Variability trials of some seedling material, and hybridization, including intergeneric crosses of various walnut species with *Carya olivaeformis*, are in progress.

Poplar. Many interspecific hybrids, some notable for their vigour and hardiness, have been developed in recent years and are under observation.

Elm. Breeding for resistance to *Graphium ulmi* is reported. Some seedlings of *U. densa, U. androssovii* and *U. scabra* and the hybrids of *U. pumila* with *U. densa* or *U. androssovii* showed resistance to the fungus. A method of vegetative propagation for some elm species has been developed.

564 *Severova, A. I.* (*Grafting as a method of developing vegetative hybrids of conifers*). (*pp. 152–66*).

Data on grafting conifers and on interspecific and intraspecific compatibility between some stocks and scions are presented. It was found that scions from adult trees retained their sexual habit and bore cones each year after grafting on to trees that had not come into bearing.

565 *Selivanova, N. Ja.* (*Variability in size of the cell nuclei in interspecific hybrids and grafted hybrids of forest trees*). (*pp. 167–72*).

Vegetative hybrids between two aspen species and interspecific sexual hybrids of aspen, maple and walnut showed a higher degree of variability in size of cell nuclei than the pure species.

566 *Rovskiĭ, V. M.* (*The effect of external conditions upon fruiting in* Pinus sylvestris *L. and* P. pallasiana *Lamb.*). (*pp. 173–79*).

The fruiting capacity and seed quality of these species have been studied in relation to their environment.

567 *Kotjukov, A. E.* (*An experiment on analysing a population of* Quercus robur *L. on the basis of phenological characters*). (*pp. 180–95*).

Ecological, biological and economic properties of two oak forms found in the Tuljskie Zaseki forest, the one distinguished by late and the other by early growth, are described. The former has a straighter stem, yields more and produces a better quality timber, but the latter is less demanding in its soil requirements, shows a higher degree of resistance to pests and diseases and is better equipped for competition with other species of forest trees.

568 (*Reports of deputies from scientific research institutes and higher teaching establishments*). (*pp. 196–202*).

Among these briefly summarized reports are some that include references to Mičurinite genetics.

569 (*Resolution adopted at the interdepartmental scientific conference, dealing with questions concerning the breeding of forest trees and seed growing in forestry, held at the Forestry Institute of the USSR Academy of Sciences in Moscow on 27–30 January 1950*). (*pp. 203–05*).

A list of economically important forms of forest trees developed in the USSR in recent years, most of which are referred to in Pravdin's report, is given. Formal genetics is criticized and improvements in breeding methods on the basis of the principles advocated by Lysenko are suggested.

570 Grüll, H.
Bestandesanerkennung und Plusbaumauswahl—eine Voraussetzung einer zielbewussten Forstpflanzenzüchtung.
(**Certification of stands and plus tree selection, an essential basis of systematic forest tree breeding**).
Allg. Forstztg. 1954 : **65** : 105–07.

The relative importance of the selection of (*a*) local races, (*b*) plus trees from stands of such races and (*c*) individual trees for progeny testing is explained, with special reference to proposed legislation for the improvement of production and quality in Austrian forests.

571 Veen, B.
General remarks on provenance research in forestry.
Euphytica, Wageningen 1954 : **3** : 89–96.
The author comments upon some of the chief selection factors leading to the formation of ecotypes, a few examples of successful or unsuccessful introduction of conifers of foreign provenance in European countries and the aims and general procedure of provenance trials. He draws attention to the need of exact description of the localities of different provenances in making seed collections, expresses the view that single-tree progeny trials are not provenance experiments in the proper sense, and advocates an approach to provenance problems on an international basis.

572 Bein, O.
Röntgenbilder bei Analysen von Forstsamen. (**X-ray photographs in analyses of forest tree seeds**).
Allg. Forstztg. 1954 : **65** : p. 131.
By the technique here described (1) seeds with or without embryo and endosperm, (2) polyembryony and other abnormalities such as twisted or split embryos, and (3) embryo length can be determined in seed of forest trees.

573 Pisek, A. & Larcher, W.
Zusammenhang zwischen Austrocknungsresistenz und Frosthärte bei Immergrünen. (**Relation between resistance to desiccation and frost hardiness in evergreens**).
Protoplasma 1954 : **44** : No. 1 : 30–46.
A physiological study of the role of various plasmatic and environmental factors in conditioning resistance to desiccation and frost hardiness in isolated needles of *Pinus cembra* and *Picea excelsa* and in leaves of *Rhododendron ferrugineum, Hedera helix* and other plants has shown both types of resistance to be based in part on some common plasmatic component.

574 Strokov, V. V.
(**Economically valuable hardy forms of *Quercus suber***).
Les. Hoz. (Forestry) 1953 : No. 8 : 12–15. [Russian].
Some forms pertaining to botanical vars. *genuina, occidentalis* and *subcrinita* that are tolerant of temperatures of —12·3°C to —15·1°C have been selected in the Caucasus.

575 Cottam, W. P.
Prevernal leafing of aspen in Utah mountains.
J. Arnold Arbor. 1954 : **35** : 239–48.
Early-leafing colonies of *Populus tremuloides* var. *aurea* represent distinct genetic strains and usually such strains can be identified at all seasons by their morphological characters. The early-leafing forms are confined to the higher elevations. Saplings of early and late leafing strains transplanted to an elevation of 4,500 ft. exhibited the same differences in leafing behaviour as their parental colonies at 7,800 ft. It is postulated that sexual mutations of the late-leafing parental type occurred in Pluvial times and that early-leafing strains migrated to the higher elevations after the retreat of the mountain ice and subsequently came to dominate the upper limits of the aspen belt because of their longer photosynthetic period and physiological adaptation to lower temperatures, clonal reproduction during postglacial time having resulted in the merging of late and early leafing forms into single forest stands.

576 Klug, W.
Die Balsampappeln als Fangbäume. (**The balsam poplars as trap trees**).
Allg. Forstztg. 1954 : **65** : 155–56.
The writer observed that the balsam poplar, *Populus simonii*, when grown in otherwise pure stands of *P. robusta* and *P. angulata*, was much more severely attacked than the other species by *Saperda carcharias* and *Cossus cossus*. He therefore suggests that balsam poplars could be used as trap trees in poplar plantations in Austria.

577 Günzl, L.
Ergebnisse der österreichischen Pappelsortenprüfung 1949–1952. (**Results of the Austrian trials of poplar varieties, 1949-52**).
Allg. Forstztg. 1954 : **65** : 125–31.
This report contains particulars to date of the performance of a miscellaneous collection of poplar clones and varieties from Germany, the U.S.A., Italy and Austria in comparative trials in progress in Austria.
Subjects discussed include variation in growth increment and the effect of long and short day and of other environmental factors upon growth.

578 Johnson, A. G.
***Betula lenta* var. *uber* Ashe.**
Rhodora 1954 : **56** : 129–31.
Attempts to rediscover the above variety, regarded as a distinct species by Fernald, in the type area in Virginia have failed. It is concluded that the variety was based on an aberrant individual tree which is no longer extant.

579 KRYLOV, G. V.
(A new birch species from the Tomsk province).
Bot. Ž. (Bot. J.), Moskva 1954 : **39** : 250–55. [Russian].

An account of the new species *Betula krylovii* is given.

580 Verslag over het jaar 1953. **(Report for the year 1953).**
Meded. Inst. Toegep. biol. Onderz. Nat. 1954 : No. 16 : Pp. 32.

This report includes an account of work carried out in the Netherlands since 1928 in breeding for resistance to the Dutch elm disease. The highly resistant types *Ulmus carpinifolia* 'Christine Buisman' obtained from Spain and *U. carpinifolia* 'Bea Schwarz' from France have been crossed with susceptible forms to produce hybrids combining resistance to *Ophiostoma* with good growth habit (cf. *PBA*, Vol. XXIV, Abst. 3385). Good results were also obtained by employing *U. carpinifolia* '1' as pollinator or *U. wallichiana* as ♀ parent, the cross *U. glabra* '49' x *U. carpinifolia* '1' giving particularly encouraging results. Many of the *Ophiostoma*-resistant hybrids obtained proved however to be highly susceptible to *Nectria cinnabarina*, a factor which further complicates the breeding programme.

581 CLIFFORD, H. T.
Analysis of suspected hybrid swarms in the genus *Eucalyptus*.
Heredity 1954 : **8** : 259–69.

Studies of stands of trees in Victoria possessing characters intermediate between those of *E. elaeophora* and *E. goniocalyx* are described; such stands only occurred in localities where these species grew nearby, suggesting that the intermediate trees were of hybrid origin. Analysis of the variability shown by the seedling leaves of the progenies of trees typifying one or other of the species or the intermediate form provided further support for this hypothesis. In studying the progenies, the means and variances of the length-breadth ratios of the seedling leaves were used to construct triangular diagrams; it is suggested a "triangle" method can be generally applied in the determination of the origin of hybrid swarms derived from parents presumably differing with respect to alleles for a given quantitative character.

582 LEE, C. L.
Sex chromosomes in *Ginkgo biloba*.
Amer. J. Bot. 1954 : **41** : 545–49.

Investigations on mitosis and meiosis in ♂ and ♀ trees of *G. biloba* ($2n = 24$) have led the author to conclude that the two sexes are caryotypically identical except with respect to one pair of chromosomes. The diploid complement of either sex was found to contain two pairs of metacentrics and ten pairs of subtelocentrics. The members of one pair of metacentrics were markedly longer than the other chromosomes of the complement and were homomorphic with respect to a satellite. Both chromosomes of one pair of subtelocentrics bore a satellite at the end of the long arm in the ♀ form but in the ♂ only one was satellited. The author suggests that the factors for sex determination are situated in this pair.

583 NEWCOMER, E. H.
The karyotype and possible sex chromosomes of *Ginkgo biloba*.
Amer. J. Bot. 1954 : **41** : 542–45.

The ♂ haploid caryotype of *G. biloba* ($n = 12$) is described as consisting of ten subtelocentric chromosomes of approximately equal length, one metacentric similar in size to the subtelocentrics, and one dimorphic chromosome, the largest of the complement, appearing as metacentric in approximately half of the microspores examined and as submedian in the other half. One of the subtelocentrics bears a satellite on the long arm, another carries a satellite on the short arm. It is suggested that the large dimorphic chromosome is associated with sex determination.

584 ANDERSSON, E.
Några data om pollenvariationen och pollenfertiliteten hos gran och tall./ **Some data concerning the pollen variation and pollen fertility of spruce and pine.**
Svensk Papptidn. 1954 : **57** : 242–55, 654–68; and (abridged) in English, 669–76.

As a contribution to the general question of modifiability and variation of pollen in conifers, a comprehensive study of differences in pollen size and fertility in *Picea abies* and *Pinus sylvestris* has been carried out in Sweden. Comprehensive analyses of pollen measurements and some observations on pollen quality as determined by the acetocarmine staining reaction indicate that, in the spruce and pine material investigated, pollen size is affected by environment and heredity.

585 MARKAWITZER, J.
Kreuzungsversuche mit deutschen und schwedischen Fichtenarten. **(Hybridization experiments with German and Swedish spruce species).**
Allg. Forstztg. 1954 : **65** : p. 226.

The results of crosses conducted at the Forestry

Station at Sundmo, Sweden, between spruces of Swedish and German provenance are reported briefly. Some hybrids that combine the faster growth habit of the German form with the greater resistance to frost of the Swedish form have been obtained.

VEGETABLES

586 Evdokimov, M. M.
(New standard varieties of vegetables, including cucurbits, in the USSR).
Sad i Ogorod (Gdn. & Veg. Gdn.) 1954 : No. 6 : 17–20. [Russian].

Beet. Varieties developed in recent years include Podzimnjaja A0474 [Late Autumn A0474], a nonbolting variety giving a higher yield than Bordeaux 0237.

Carrot. The new variety Gribovo is described. It is as early as Nantes 04 but has better keeping properties and gives a higher yield.

Melon. Two new varieties, Limonno-Želtaja [Lemon-yellow] and Novinka Kubani [Novelty of Kubanj], both of which outyield Kolhoznica [Collective Farmer], have been developed. Limonno-Želtaja matures early and its flavour and transportability are good. Novinka Kubani is a large-fruited midseason type showing resistance to diseases.

Pumpkin. Stolovaja Zimnjaja A5 [Winter Table A5] is described as a late drought-resistant variety with higher contents of sugar, solids and vitamin C than Perehvatka 69/19 [Girdle 69/19]. Its flavour and transportability are good. Vitaminnaja is a late high-yielding form producing large fruits with a high carotene content.

587 Kraai, A.
The use of honey-bees and bumble-bees in breeding work.
Euphytica, Wageningen 1954 : **3** : 97–107.

Experiments on the use of bees in isolation compartments in the greenhouse and in small isolation cages at the Wageningen Institute of Horticultural Plant Breeding, Netherlands, are described; they deal chiefly with insect-pollinated vegetable crops. In isolation compartments 5 x 3 x 2 m., the interpollination of groups of plants can be successfully effected by using small colonies in hives, without a queen. In small glass cages with the dimensions 0·8 x 0·8 x 2 m., the crossing of two plants or selfing of individuals can be most satisfactorily accomplished by using bumble-bee queens infested by *Sphaerularia bombi* or very small queenless honey-bee colonies in miniature hives; bumble-bee drones and psithyri are also effective. Particulars of methods of capturing and treating the bumble bees and of raising and treating the honey-bee colonies are provided.

588 Hubbeling, N.
Voor de practijk bruikbare methoden van resistentieonderzoek bij tuinbouwgewassen. (**Practical methods of investigating resistance in horticultural crops**).
Tuinbouwdagen 1954, Wageningen, Meded. Dir. Tuinb. 1954 : **17** : 595–606.

The practical aspects of breeding for disease resistance are examined, emphasis being laid on methods of testing for resistance and the importance of carefully controlled and regulated experimental conditions. It is a mistake for the breeder to regard the development of disease-resistant varieties as an end in itself; he must seek to combine this character with improvements in other directions. The author concludes by briefly summarizing progress made in both the Netherlands and the USA in the development of disease-resistant varieties of horticultural crops.

589 Hösslin, R. v.
Über den Einfluss der Korngrösse des Saatgutes auf den Ertrag von Rettich und Kohlrabi. (**On the influence of seed size in seed stock on the yield of radish and kohl rabi**).
Züchter 1954 : **24** : 220–23.

A greater proportion of large seeds than of small seeds germinated in experiments conducted at the Institute of Horticulture, Weihenstephan, Germany. Plants from large seeds were also found to have a more vigorous growth and to mature earlier. The economic importance of breeding for larger size of seed, especially in early varieties, is emphasized.

590 Davis, E. W.
Rapid identification of recessive-white onion bulbs by use of ammonia fumes.
J. Hered. 1954 : **45** : p. 122.

White-bulbed onions may be homozygous for *I*, the factor inhibiting pigment production, or recessive for *i*, with the accompanying genes *ccRR*, *ccRr* or *ccrr*; *C* is a basic gene essential for any pigment production; in the presence of *C*, *R* is responsible for red pigment and *r* for yellow bulb colour. Practically colourless flavone is produced in *II* bulbs but not in the recessive whites; the two genotypes can therefore be distinguished by exposing outer fleshy

scales to concentrated ammonia fumes, which cause a yellow reaction in the dominant whites.

591 Jones, H. A., Peterson, C. E. & Franklin, D. F.
Abundance: a new high-yielding storage-type hybrid onion.
Spec. Rep. Ia agric. Exp. Sta. 1954 : No. 6 : Pp. 2.
Produced by crossing the male-sterile line B2108 with inbred B2215, both derived from Early Yellow Globe, Abundance is an F_1 hybrid giving exceptionally high yields under long-day conditions in areas where the parental variety is adapted.

592 **New era for onions.**
Agric. Res., Wash. 1954 : **3** : No. 1 : 10–11.
Twelve new F_1 hybrids developed cooperatively by the Agricultural Research Service and state experiment stations have been released for the northern region of the USA, under the names Early Harvest, Fiesta; Pioneer, Abundance, Champion, Contender, Elite, Encore, Aristocrat, Bonanza, Epoch and Surprise. Attention is also drawn to pink-root resistant hybrids developed for the southern states.

593 Celestre, M. R. & Di Guglielmo, C.
Effetti di un campo elettromagnetico alternativo sulla mitosi in *Allium cepa*.
(**Effects of an alternating electromagnetic field on mitosis in *A. cepa*).**
Ann. Sper. agr. 1954 : **8** : 1431–36.
Treatment of actively dividing root tips in an alternating electromagnetic field caused chromosome breakage, stickiness and other associated aberrations.

594 Boos, G. V.
(Perennial horticultural crops should be introduced).
Sad i Ogorod (Gdn. & Veg. Gdn.) 1954 : No. 8 : 21–23. [Russian].
Trials of perennial crops at Puškin are reported briefly. Of the asparagus varieties tested, Fioletovyĭ Boljšoĭ [Large Mauve], Laon and Krupnyĭ Zelenyĭ [Large Green] formed the best spears; Krupnyĭ Zelenyĭ matured earlier than any other variety. High-yielding varieties of sorrel, some notable for their earliness and hardiness and others for their large leaves, are described. The rhubarb varieties Viktoria, Altaĭskiĭ Mestnyĭ [Local Altaĭ] and Ranniĭ Krasnyĭ [Early Red] are described; they mature early and have petioles 40–60 cm. long. The late-maturing variety Ispolinskiĭ [Gigantic] produced even longer petioles.

595 Popova, E. M.
(A new cabbage variety—Zimnjaja Gribovskaja).
Sad i Ogorod (Gdn. & Veg. Gdn.) 1954 : No. 6 : 74–75. [Russian].
Zimnjaja Gribovskaja [Winter Gribovo] from Belorusskaja [White Russian] x Moskovskaja Pozdnjaja [Late Moscow] is more productive than Belorusskaja and forms a larger head. It is a midseason type with good keeping properties and high sugar and vitamin C contents.

596 Dharampal Singh & Mehta, T. R.
A new leaf colour variant in *rai* (*Brassica juncea* L.).
Sci. & Cult. 1954 : **20** : p. 85.
A spontaneous mutant of *B. juncea* with light-green instead of the normal dark-green leaves is reported from the Government Agricultural Research Farm, Kanpur, India. The mutant bred true to type and proved recessive when crossed with normal plants. A study of segregation ratios in the F_2 of crosses with dark-green plants indicated that the variant must have arisen as the result of the simultaneous mutation of two genes.

597 Ivanoff, S. S.
Measuring shipping qualities of watermelons according to Snowden's method.
J. Hered. 1954 : **45** : 155–58.
The capacity of water melons for surviving transport can be measured by determining the extent to which a 3″ strip of rind can be bent into a circle. The rind of the citron type can be bent into a complete circle; the rind of varieties with poor transporting qualities may break even before making an arc of 60°. The method was originally devised by J. E. Snowden.

598 Whitaker, T. W.
A cross between an annual species and a perennial species of *Cucurbita*.
Madroño 1954 : **12** : 213–17.
Hybrids have been obtained from crossing the perennial species *C. ficifolia* with the annual *C. andreana*. The hybrids were annual, very vigorous and completely sterile, but produced parthenocarpic fruits with ease when open or back pollinated. Meiosis was extremely irregular.

599 Davis, G. N.
New banana squash.
Calif. Agric. 1954 : **8** : No. 6 : p. 15.
The new squash Orange Banana was selected from Pink Banana at the California University,

Davis. It has bright orange skin, thick flesh, a small seed cavity and fruits larger than those of any other strain of the Banana type. At present its rind is too tough for processing; an attempt is being made to correct this defect.

600 Sorts- og stammeforsøg med pickles- og sylteagurker. 1951–1953. (**Variety and strain trials with gherkins for pickling and for salting, 1951-53**).
Tidsskr. Planteavl 1954 : **57** : 723–26.
In trials on different types of soil at four Danish experimental stations, 17 pickling strains and 16 salting varieties were compared on the basis of (*a*) yield of usable fruits; and (*b*) their shape, smoothness, uniformity and estimated commercial value. The seven pickling and the six salting varieties approved are described.

601 Gurkfläcksjukan. (**Cucumber gummosis**).
Tidskr. Lantm., Helsinki 1954 : **36** : p. 135.
J. E. Jamalainen of the Phytopathological Division of the Finnish Agricultural Research Institute reports that cucumber varieties resistant to gummosis are to be tested for their adaptation to conditions in Finland, as a preliminary to their use in gummosis control in that country.

602 Schaible, L. W.
Some aspects of resistance to cucumber virus 1 in cucumber and squash.
Diss. Abstr. 1954 : **14** : Publ. No. 8198 : 904–05. (Abst.).
The cucumbers Chinese Long and Tokyo Long Green react differently to the above virus, the former showing more mottling initially but subsequent symptomless recovery, and the latter less initial mottling but progressively severer symptoms. F_5 progenies from the cross between the two varieties were subjected to several types of tests for resistance to the virus; except when approach-grafted on infected susceptible varieties, resistant segregates maintained a near-immune reaction. In the F_1 of resistant (Chinese Long x Tokyo Long Green) F_5 x a susceptible parent, resistance was partially dominant. To facilitate breeding for resistance, experiments were carried out on the problem of suitable source of inoculum, method of storing inoculum, dosage and technique of inoculation; the atomized spray method was as uniform a method of inoculation as hand rubbing. Selections considered to be promising for breeding *Cucurbita pepo* varieties resistant to cucumber mosaic have been obtained from introductions FPI 177,371 and 174,192.

603 Turbin, N. V., Gorobec, A. M. & Narbut, S. I.
(**An unutilized reserve for increasing yielding capacity in tomatoes**).
Zemledelie (Agriculture) 1954 : No. 5 : 114–19. [Russian].
Experiments are described in which crossing of two tomato varieties without previous emasculation of the seed parent gave rise to as much heterosis as crossing the same parents after emasculation; the set of fruits and of seeds was also greater. When flowers of the variety Planovyĭ [Plan] were pollinated at the beginning of the flowering period with pollen from Bison, the progeny from emasculated plants was 17% more productive than the better parent, the progeny from unemasculated plants 55% more; pollinations in the middle of the flowering period gave 54 and 55% increases respectively and pollinations at the end of the flowering season gave no increase in yield. When a form with standard growth habit was pollinated with an indeterminate form, segregation occurred but yield increases were observed even in the segregates with the maternal, standard type of growth, though the increase was not so great as that in the segregates with the dominant growth habit. The fact that any increase at all was obtained is ascribed to multiple fertilization. From these experiments it is concluded that the presence of maternal pollen does not prevent the production of heterotic progeny from cross pollination; in fact when pollination was effected at the optimum time the progeny from unemasculated flowers displayed slightly more heterosis than that from emasculated. A list is given of the varietal combinations that have given the best results; these were obtained by using a mixture of pollen from several varieties, choosing the most vigorous plants both as seed and pollen parents, and effecting pollination at the height of the flowering period. Pollination was performed with a large quantity of pollen and repeated after one to two days; this repetition was found to lead to better sets, more viable seed and better yield in the progeny.
By the application of this method total yields exceeding those of Bison by 18 to 76 c. per ha. were obtained in 1951, the yield of ripe fruit being 2–2·5 times that of Bison. In 1952 the yield from hybrid seed exceeded that from the tomato Puškinskiĭ by 139% and a much higher proportion of it ripened in early August rather than in September.

604 Burdick, A. B.
Genetics of heterosis for earliness in the tomato.
Genetics 1954 : **39** : 488–505.

"It has been shown that greater earliness is one of the principal manifestations of heterosis in the tomato but that this hetorosis is not evident, as a rule, until the time of the first ripe fruit.

"The time of flowering in most hybrids is approximately intermediate between the flowering dates of the two parents.

"Notable exceptions were found to the average earliness relationship between parents and hybrids. These exceptions indicated that even though the resulting heterosis appeared to be the same in two hybrids, their patterns of intermediate development might be quite different. The maturity genes of both parents appear to be expressing themselves, at different stages, in some hybrids. This would support the view that dominance is a relative phenomenon, depending on the stage of development and the environmental circumstances under which it is measured and that the excellence of hybrids may be attributable to the co-expression of the alleles from both parents, made possible by the existence of dominance along with ontogenetic and environmental gradients.

"From a constant parent regression analysis of the data, it appears that dominance is the principal cause of earliness heterosis in the tomato." [Author's summary].

605 Misro, B.
The experimental production of chimeras in plants.
Sci. & Cult. 1954 : **20** : 95–97.

Of 553 intergeneric and interspecific grafting operations carried out at the Central Rice Research Institute, Cuttack, India, on 10 species of the Solanaceae, 377 are reported to have resulted in the formation of chimeras. Two of these chimeras are described in detail. *Solanum nigrum* grafted on to *Lycopersicon esculentum* resulted in a periclinal chimera with an external layer of *S. nigrum* tissue enveloping a core of *L. esculentum* cells. The plant differed in appearance from both stock and scion parents and tended to resemble *S. koelreuterianum*. *L. esculentum* grafted on to *S. nigrum* gave a plant said to resemble *S. tubingense*. It was also a periclinal chimera, with an external layer of *L. esculentum* tissue enclosing a core of *S. nigrum* cells. The pigmentation and morphology of the stem and leaves were similar to those of *L. esculentum* while the flowers and berries had the characters of *S. nigrum*.

606 Fedotov, A. L.
(New forms of early tomatoes).
Priroda (Nature), Leningrad 1954 : No. 6 : 107–09. [Russian].

Outdoor forms with growth periods of 90–99 days and distinguished by productiveness and high percentage of ripe fruits have been developed at Moscow. They were obtained by first shattering the inheritance of Lučšiĭ iz Vseh [Best of All] and then vernalizing the seed of the resultant plants at 0–2° C for 10–12 days immediately before sowing. The shattering effects were produced by outdoor cultivation for several generations or by grafting on *Solanum nigrum*.

607 Aĭzenštat, Ja. S.
(The effect of variability in age condition of annual plants upon formation of the hereditary constitution of their progenies).
Ž. obšč. Biol. (J. gen. Biol.), Moscow 1954 : **15** : 65–78. [Russian].

Experiments conducted at Maĭkop and Leningrad with peas and tomatoes are said to show that the age of the plant affects the segregation ratio of its progeny. The F_1 and F_2 of crosses in which the flowers of the maternal parent were pollinated early or late in the season contained a high percentage of forms resembling the paternal parent, while the F_1 and F_2 of fertilizations carried out in midseason resembled the maternal parent. The segregation of tomato hybrids also varied according to the different positions on the plant of the inflorescences used for pollination.

608 Bishop, C. J.
A stamenless male-sterile tomato.
Amer. J. Bot. 1954 : **41** : 540–42.

A mutant showing only vestigial development of the stamens occurred in the F_2 of Early Chatham x Bounty at the Experimental Station, Kentville, NS. The female parent was a male-sterile form bearing nondehiscent anthers. The stamenless condition depended upon a single recessive gene (*sl*). Mutant plants grown during winter under natural light in the greenhouse occasionally develop abnormally shaped stamens containing viable pollen; plants produced by self fertilization with this pollen all exhibit the stamenless character. It is suggested that the mutant offers new possibilities for hand pollination; its flower structure would probably render it unsuitable for natural pollination by insects.

609 Radžabli, A. D.
(A new tomato variety).
Sad i Ogorod (Gdn. & Veg. Gdn.) 1954 : No. 6 : 20–21. [Russian].

Savalan, from Bison x Korolj Rannih [King of the Earlies], has outyielded the standard Bison in recent Kazah trials. The high yield is due to a longer fruiting period. The new variety matures a few days later than Bison, but is hardier and resistant to diseases. It produces large firm-skinned fruits of good flavour.

610 Cook, A. A.
Reaction of *Lycopersicon* species to regional isolates of *Septoria lycopersici*.
Phytopathology 1954 : **44** : 374–77.

Accessions representing five species and three subspecies and, in addition, a series of progenies suspected of having the origin *L. esculentum* x *L. peruvianum* were tested for their reactions when inoculated with eight isolates of *S. lycopersici*. Average diameter of lesions proved to be the most satisfactory criterion for evaluating relative resistance and relative virulence. The isolates differed significantly in virulence.

611 Prasanna Varma, R.
Soil conditions and root diseases. X. The tomato wilt fusaria.
J. Indian bot. Soc. 1954 : **33** : Nos. 1–2 : 43–72.

Tabulated data on the comparative cultural characters and pathenogenicity of 38 monoconidial isolates of *Fusarium* collected at various localities in south India are presented. When the strains were cultivated on the tomato variety Bonny Best, isolate 37 (*F. lateritium* var. *uncinatum*) proved the most virulent and isolate 34 (*F. solani* var. *martii*) the least virulent. Of the nine varieties of tomato most widely cultivated in India, Marglobe proved the least susceptible to wilt.

612 Day, P. R.
Physiologic specialization of *Cladosporium fulvum* in England and Wales.
Plant Path. 1954 : **3** : 35–39.

Six races of *C. fulvum*, equivalent to the Canadian races 1, 2, 5, 7, 8 and 9, have so far been identified. Leaf-mould resistant tomato varieties cultivated in Britain were tested for their reactions to races 1, 2, 5 8 and 9. No single variety exhibits resistance to all races but several, including Antimold B (Cf_1Cf_2) and Sapsford's 1, are still valuable commercially on account of the comparative scarcity of the races to which they are susceptible. Varieties with the Vetomold type of resistance (Cf_2) have declined in commercial importance because of their susceptibility to the widespread race 5. Varieties with the gene Cf_1 for resistance, such as Leaf Mould Resister 1 and Antimold A_1, are susceptible to races 2 and 8 and resistant to the remaining three; their fate is in the balance. Further breeding, including the production of F_1 hybrids, is expected to overcome the problem of the physiological specialization of *C. fulvum*.

613 Goĭko, V. A.
(The egg plant Odessa 52).
Sad i Ogorod (Gdn. & Veg. Gdn.) 1954 : No. 6 : 22–23. [Russian].

This new variety has been selected from material cultivated in the Odessa province. It is hardy, matures early and gives a high yield of good quality fruits. In the 1951–1953 trials it outyielded Grečeskiĭ [Greek] and Gribovo and has been made a standard for the Ukraine.

614 Kozlov, F. B.
(*Phaseolus* varieties for peaty soils).
Zemledelie (Agriculture) 1954 : No. 5 : p. 123. [Russian].

The new variety Belorusskaja 288 is described as being midearly, resistant to anthracnose, *Ascochyta* and other fungous diseases, and absolutely free from lodging; its yields are higher in years of drought than in wet years. Belorusskaja 145/1 is also drought resistant, free from lodging and shedding and resistant to fungous diseases, as is also Mestnaja Krasnaja [Local Red], which is a mass selection from a local strain and is distinguished also by good cooking quality.

615 Moschini, E.
Prove comparative fra alcune varietà di soia di nuova costituzione. **(Comparative tests of some newly produced varieties of soya bean).**
Ann. Fac. Agr. Pisa 1953 : **14** : 201–16.

Tests with eight selections were carried out in 1951–53; the yields compared very favourably with those of varieties such as Lincoln, Blackhawk and Flambeau, and some selections were notably earlier in ripening and displayed considerable resistance to drought.

616 **New Lee soybean.**
Seed World 1954 : **74** : No. 12 : p. 27.
Lee soybean is developed for Southeast; variety resists shattering; yields well.
What's New Crops Soils 1954 : **6** : No. 9 : p. 29.

The nonshattering variety Lee (S–100 x CNS)

has been released by the US Regional Soybean Laboratory for cultivation in the south-eastern states (cf. *PBA*, Vol. XXIV, Abst. 3483). It is highly resistant to bacterial pustule, wildfire, frogeye and purple seed stain and tolerant of nematode. It matures 7–10 days earlier than Jackson (cf. *PBA*, Vol. XXIV, Abst. 1519).

617 **Increase program under way for new Renville soybean.**
What's New Crops Soils 1954 : **6** : No. 9 : p. 27.

Renville, a new variety of soya bean developed by the US Regional Soybean Laboratory, Urbana, Ill., and recommended for cultivation in South and Central Minnesota, is described. It gives a good yield of yellow, medium-sized beans with a high oil content.

618 Humphrey, L. M.
Effects of neutron irradiation on soybeans. II.
Soybean Dig. 1954 : **14** : No. 7 : 18–19.

Lines derived from neutron-irradiated seed of Dortchsoy 2, showing some improvement in resistance to shattering and other characters, are under test at the Robert L. Dortch Seed Farms, Scott, Ark.; a wide range of mutations without economic significance was also obtained from this seed (cf. *PBA*, Vol. XXII, Abst. 2342).

619 Crittenden, H. W.
Factors associated with root-knot nematode resistance in soybeans.
Phytopathology 1954 : **44** : p. 388. (Abst.).

It is suggested that varieties with the following characters are likely to be nematode resistant: long tapering roots; roots tending to become woody at an early stage in plant development; satisfactory growth and yield in soils containing low amounts of K; and seeds low in oil content. In tests in Delaware, the hay and green-manure variety Laredo has exhibited most resistance; of the varieties suitable for bean production, Blackhawk, Monroe and Anderson appear to be highly resistant.

620 Sortsforsøg med lave marværter 1950–52. (**Variety trials with dwarf marrow fat peas, 1950-52**).
Tidsskr. Planteavl 1954 : **57** : 721–22.

Trials at the Virum, Blangstedgaard, Spangsbjerg and Hornum experimental stations in Denmark were continued (cf. *PBA*, Vol. XXIV, Abst. 1532). Yield and date of plucking were the criteria adopted in assessing the value of the 13 varieties listed in the present note. The following varieties were the best: Safir Toftø, Balder, Imperial Toftø, Continental Ny Munkegaard [Continental New Munkegaard], Beta and Wiwo Hunderup.

621 Scheibe, A.
Der *fasciata*-Typus bei *Pisum*, seine pflanzenbauliche und züchterische Bedeutung. (**The *fasciata* type in *Pisum*, its importance in culture and breeding**).
Z. Pflanzenz. 1954 : **33** : 31–58.

The possible economic importance of fasciation in peas is discussed. In 1941, three plants of the *fasciata* type, believed to have arisen from a spontaneous gene mutation in 1939, were discovered at the Institute of Agriculture, Munich, and their progeny crossed at the Max Planck Institute for Breeding Research, Neuhof, with a large number of culinary and forage varieties. Fasciation was shown to depend upon a single recessive gene, *fa*, and it proved possible, by back-crossing, to eliminate such undesirable characters as late maturity and short pods usually associated with the *fasciata* type. Lines into which *fa* has been bred show simultaneous maturing of all pods on a given stem, increased resistance to lodging and, owing to the shortened period of flowering, less susceptibility to attack by the pea moth.

622 Stegaĭlo, T. A.
(**Age of the reproductive cell at time of fertilization in relation to the inheritance of characters in peas**).
Agrobiologija (Agrobiology) 1954 : No. **3** : 100–03. [Russian].

The inheritance of seed colour in hybrids between green-seeded and yellow-seeded forms was found to vary according to the age of the female sex cell. In most crosses the seed was yellow when the ovules were fertilized at an early stage but some green seed was formed when fertilization was delayed for a few days.

623 Warnock, S. J. & Hagedorn, D. J.
Stigma receptivity in peas (*Pisum sativum* L.).
Agron. J. 1954 : **46** : 274–77.

In investigations at the Wisconsin Agricultural Experiment Station, histological examination revealed that pollen grains germinated only on the membranous layer situated at the very tip of the pistil. This information on the exact position of the receptive surface has led to an improved technique of artificial pollination. Experiments on Wisconsin Perfection showed that at 16°C the stigmas remained receptive for three days after emasculation; at 20° and 24°C

the stigmas retained good receptivity for only one day. The results of field experiments on three varieties also pointed to temperature as a factor affecting duration of receptivity.

624 FOURMONT, M. R.
Introduction à un système de nomenclature des variétés de pois cultivées en France. (Introduction to a system of nomenclature for pea varieties cultivated in France).
CR Acad. Agric. Fr. 1954 : **40** : 499–502.
A new system of classification of pea varieties cultivated in France, based upon length of stalk, colour and shape of leaves, number of stipules, morphology of the inflorescence and shape, colour and starch content of the seed is outlined briefly.

625 SKOLKO, A. J., GROVES, J. W. & WALLEN, V. R.
***Ascochyta* diseases of peas in Canada—with special reference to seed transmission.**
Canad. J. agric. Sci. 1954 : **34** : 417–28.
An account of the incidence of *Ascochyta* spp. in Canada is given, with special reference to its mode of transmission. Alaska and A100 proved the least susceptible of 44 varieties of pea inoculated with 10 isolates of *A. pisi* in tests conducted over a five-year period by the Botany and Plant Pathology Division, Department of Agriculture, Ottawa.

626 ENKEN, V. B.
(Breeding the chickpea for resistance to *Ascochyta*).
Zemledelie (Agriculture) 1954 : No. 7 : 82–87. [Russian].
All new varieties recently developed at Kubanj have been derived from *Ascochyta*-resistant material obtained from the Institute of Plant Industry. They include the tall, yellow-seeded hybrids OS 192 and 227, which are resistant to lodging and outyield Kubanj 16.

627 BARTON, D. W.
Quality, maturity, and yield measurements of twelve sweet corn varieties, 1951 to 1953.
Bull. NY St. agric. Exp. Sta. 1954 : No. 765 : Pp. 22.
The results of yield trials of twelve varieties conducted at the New York State Agricultural Experiment Station from 1951 to 1953 are presented, together with data on period to maturity, percentage of moisture in the grain, average ear weight and other properties. All the varieties tested are considered to possess desirable agronomic qualities, the choice of variety depending on the particular use for which it is intended.

628 ANDREW, R. H.
Two new Wisconsin sweet corn hybrids.
Canner 1953 : **116** : No. 7 : 14–16.
The early 12-rowed hybrid Wisconsin Golden 900 (W3742 x WC7) and midseason hybrid Wisconsin Golden 950 (W3647 x W3742) with 12–16 rows both possess high yielding capacity, good quality and suitability for mechanical picking and canning.

629 GUZMAN, V. L. & WOLF, E. A.
Effect of 2,4-D on four sweet corn hybrids at different stages of growth.
Proc. Fla. hort. Soc. 1953 : **66** : 141–47.
Gold Rush and Golden Security suffered more physiological injury from spraying with 2,4-D than did Calumet and Ioana in experiments conducted at the Everglades Experiment Station, Fla. It is suggested that most damage is caused at the tasseling and ear differentiation stage, which occurs when the plants are slightly over three inches tall.

630 CLARY, G.
A study of the inheritance of expansion in popcorn.
Diss. Abstr. 1954 : **14** : Publ. No. 8033 : p. 915. (Abst.).
Linkage between *P* for cob colour and factors influencing expansion was found in Supergold 18 and Baby Golden 1708 but not in South American 24 or Hulless 10001. Linkage between genes for silk colour and expansion was detected in Supergold 18. Linkages between points of breakage and factors affecting expansion are reported for four Supergold inbreds. Since the position and number of the effective genes were dissimilar, further mass selection within the parent variety, followed by recurrent selection, should result in improved expansion. Inbred lines with good general combining ability possessed effective factors for expansion absent in lines with poor combining ability. The high amount of interaction in some crosses was partly due to epistatic effects of genes for expansion. Differences in expansion among single and three-way crosses were apparently due to differences not only in the number of effective factors in the parents but also to differences in the mode of inheritance of this character. It was estimated that Baby Golden 1708 and

Supergold 18 differed from the dent inbred Hy by 1–2 and 3–5 genes for expansion, respectively.

631 PIGOTT, C. D.
Species delimitation and racial divergence in British *Thymus*.
New Phytol. 1954 : **53** : 470–95.

A monographic survey of British representatives of the genus *Thymus* is presented. Three species, *Th. serpyllum* ($2n = 24$), *Th. pulegioides* ($2n = 28$) and *Th. drucei* ($2n = 54$) are recognized, and a series of ecological races of *Th. drucei* are also differentiated. *Th. drucei* is widespread in the British Isles; *Th. pulegioides* is a south-eastern species; while *Th. serpyllum* is confined to the East Anglian Breckland. The putative history of the genus during the post-Glacial period is discussed.

632 GRAHAM, R. A.
Mint notes. V. *Mentha aquatica*, and the British water mints.
Watsonia 1954 : **3** : 109–21.

Typical *M. aquatica* is one form only of a large polymorphic taxonomic assemblage referred to by the author as water mint. It is recommended, in view of the intergradation of the various component types, that the many Latin names given to subspecific categories should be abandoned. The polymorphism does not appear to be connected with cytological variation; in most cases, $2n = 96$.

BOOK REVIEWS

KITAGAWA, T. & MITOME, M.
(Tables for the design of factorial experiments).
Baifukan Co., Ltd., Tokyo, Japan 1953 : 2.500 y. : Pp. 292 + 38 + 136 + 25 + 7 + 15 + 13 + 15 + 4 : figs. : 8 tables. [Japanese].

Readers of *Plant Breeding Abstracts* will be aware that Japanese research workers such as M. Kimura have taken a keen interest in mathematical statistics as applied to population genetics, (cf. *PBA*, Vol. XXIV, Absts. 20, 22 and 2609 and Vol. XXV, Abst. 37). The present volume is a noteworthy example of Japanese interest in another application of mathematical statistics, namely, to the design of factorial experiments.

The first part of the book, which is in Japanese, is a general introduction to the mathematical theory, and includes chapters on the principles of experimental design, analysis of variance, the analysis of experimental lay-outs, types of lay-out, and two chapters on the theory of statistical inference. The second part, which is also in Japanese, is a commentary and elucidation of part three, which is in English, and is one of the most comprehensive sets of statistical tables that has been yet assembled. The following data are provided: complete tables of 2 x 2 to 7 x 7 Latin squares, examples of 8 x 8 to 12 x 12 Latin squares and one 20 x 20 square, orthogonal Latin squares, orthogonal partitions of Latin squares, orthogonal Latin cubes, the main effects and interactions, types of balanced confounding and block allocations of 2^2–7^3 factorial designs, similar details for 2^2 x 3 to 3^2 x 2^2 and for 4 x 3 x 2 factorial designs, lay-out and analysis of $2^n - \frac{1}{2}$ to $2^n - \frac{1}{16}$ and $3^n - \frac{1}{3}$ fractional replications, examples of factorial designs with split-plot confounding, examples of factorial designs confounded in quasi-Latin squares with 0–2 subsidiary factors and involving either plaid or half-plaid squares, types of arrangement and examples of square and cubic lattices, sets of balanced incomplete block designs, and types of arrangement and examples of Youden's squares.

While the language of the first two parts will limit the usefulness of this book outside Japan and, in view of the embryonic state of Japanese statistical nomenclature, may even cause some difficulties within Japan, the last section is so comprehensive a compilation that it may well prove of considerable value for reference purposes elsewhere.

MÜNTZING, A.
Ärftlighetsforskning. En översikt av metoder och huvudresultat. (**Genetical research. A survey of methods and the main results**).
LTs Förlag, Stockholm 1953 : bound 22 Kr : unbound 18 Kr : Pp. 278 : 194 figs.

It is some years since Nils von Hofsten's books on genetical research were published, and the present author has seen the need for a new Swedish publication that would cover the advances made in genetical science since 1900. In the book under review, his aim has been to survey the whole subject of genetics and its practical applications in the present day. That the choice of what to include and what to omit

has been successfully made will appear from the curtailed summary given below of the contents of its 30 chapters, the last three of which contain: a glossary of scientific terms, a brief list of other genetical textbooks in Norwegian, Swedish and Danish, and an index.

A historical introduction is followed by three chapters on the physical basis of heredity, fertilization and the mechanism of nuclear division, reduction division and the cytology of reproduction in plants and animals. Chapters V and VI deal with Mendelism and the laws of segregation, factor interaction, pleiotropy and pollen certation, while in the next five chapters heredity and environment, populations and pure lines, the chromosome mechanism and Mendelian segregation, linkage and crossing over, and the inheritance of quantitative characters are treated. Hereditary adaptation and ecotypes form the subject of chapter XII. The next two chapters deal with sex determination and sex-linked and sex-limited inheritance. Multiple allelomorphs, self sterility and blood groups are considered in chapter XV, while structural changes in the chromosomes, spontaneous and induced mutations and the applications of induced mutation in cytogenetics are discussed in chapters XVI to XIX. Degeneration due to inbreeding and the effects of crossing inbred lines are discussed in chapter XX with reference to population studies, injurious recessives in higher animals and man, and monohybrid heterosis.

The ensuing three chapters are concerned with the results of research on interspecific hybrids, polyploids and other variations and aberrations in chromosome number; cytoplasmic inheritance and its effects in interspecific hybridization; the constancy and mode of action of the plasmon; and graft hybrids and "vegetative hybrids."

Chapter XXIV on species formation and evolution includes a clear and concise introduction to the complicated problem of apomixis and its significance in the formation of new species and forms.

The concluding chapters of the book deal with plant and animal breeding and the impact of genetical science on the study of races and the human individual and on eugenics.

The author has a style that is terse and clear and his smooth coordination of material selected from such a wide field holds the reader's interest throughout. The book is addressed to biologists, teachers, medical men, agriculturalists engaged in plant and animal production and the intelligent ordinary reader without biological training.

DEMEREC, M. (EDITOR)
Advances in genetics. Volume VI.
Academic Press Inc., New York 1954 : $9.80 : Pp. ix + 488 : figs. : tables.

Volume VI of this excellent series contains eight reviews, three of which will be of particular interest to plant geneticists. In Map construction in *Neurospora crassa*, R. W. Barratt, D. Newmeyer, D. D. Perkins and L. Garnjobst have compiled all the available data on tetrad segregation relevant to the estimation of linkage. Maps of seven linkage groups have been constructed according to these data and a number of problems related to mapping are examined. With the construction of these maps, investigations on *Neurospora* are brought to a point from which general problems regarding the nature of the gene and its action and also the mechanism of crossing-over can be better tackled than previously. D. Lewis presents a paper on comparative incompatibility in angiosperms and fungi, in which he discusses incompatibility systems in the flowering plants from the morphological, genetical and biochemical aspects, mutation of *S* genes, incompatibility in the different groups of fungi, and incompatibility as an outbreeding device and in its relation to crop improvement. In the longest but by no means the most clearly written contribution, Cytoplasmic inheritance in *Epilobium* and its theoretical significance, P. Michaelis summarizes the results of his thirty-years' work on this genus, forming the basis of his theory of inheritance in which he postulates a single genetic system composed of closely interacting nuclear genes and mutable cytoplasmic elements and in which he assigns a more active role to the plasmon than the majority of geneticists, at any rate those investigating the higher plants. Most of the ground has been covered in the 50 or so papers previously published by the author, but this survey of his numerous experiments and exposition of his theory in all its implications, including its evolutionary aspects, will be useful to those wishing to give his work the evaluation it deserves, particularly in view of recent research on microbial genetics. Of the remaining five papers two deal with human genetics: Genetic changes in human populations, especially those due to gene flow and genetic drift, by B. Glass, and The genetics of the newer human blood factors by P. Levine. Two contributions are devoted to livestock problems: Monozygotic twins in cattle by J. Hancock, and Artificial insemination and livestock improvement, by A. Robertson. A survey on The genetics of *Colias* comes from C. L. Remington.

LERNER, I. M.
Genetic homeostasis.
Oliver and Boyd, Edinburgh and London 1954 : 12s. 6d. : Pp. vii + 134 : 14 figs. : 20 tables.

In his book *The Wisdom of the Body*, published in 1932, W. B. Cannon defined and elaborated the concept of physiological homeostasis, that is, the self-regulatory processes whereby an organism stabilizes itself in spite of fluctuating environmental conditions. Other homeostatic systems have since been discerned, for instance, in psychology, and in 1950, in his book *Population Genetics and Animal Improvement*, the present author introduced the term genetic homeostasis to denote the tendency of a Mendelian population to "equilibrate its genetic composition and to resist sudden changes."

The sources of this concept derive, as Professor Lerner makes clear, from diverse sources, notably, on the developmental side, from Cannon's concept already mentioned and Waddington's notion of canalization, and on the genetic side, from some of Mather's work on polygenic inheritance and Schmalhausen's theory of stabilizing selection. The concept of genetic homeostasis also has affinities with the somewhat elusive notion of genetic inertia discussed in Darlington and Mather's *Elements of Genetics*.

In the present volume, Professor Lerner sets out to sustain the following theses: (1) in natural Mendelian populations, there is a tendency for the individuals to follow a uniform course of canalized development in spite of genetic variation; (2) Mendelian populations tend to retain a genetic structure that produces the optimum average fitness for the environment; (3) both (1) and (2) result from the greater fitness of heterozygotes over homozygotes which comes about from the stronger tendency towards canalization in the former; (4) when homozygosis exceeds a certain threshold, development is impeded and various abnormalities, here termed phenodeviants, are liable to emerge; and (5) if artificial selection for a particular character proceeds too rapidly, the norm of canalized development may be exceeded and fitness decline. It should be noted that the author is concerned with cross-fertilized organisms only, and that the examples considered are mostly taken from animal breeding experiments.

One of the most fundamental points advanced by the author is that heterozygotes are more strongly canalized than homozygotes. The principal evidence for this is given in Chapters 10, 11, 12 on the Variability of heterozygotes, Variance of heterozygotes in *Drosophila*, and Heterozygote variance in higher animals and plants, respectively. These chapters do indeed demonstrate that heterozygotes are less variable than the corresponding homozygote in some instances, but the considerable number of cases in which the reverse holds seriously weakens the general applicability of the author's conclusion. The evidence for point (4) on the deleterious effects of inbreeding *per se* is more convincing though not entirely compelling, and the author is probably justified in his criticism of attempts to explain inbreeding depression as a function of gene content alone. The suggestion, however, that pea and tomato rogues may be phenodeviants arising from a converse process to that found in cross-fertilized organisms is not very enlightening.

When we come to suggestions as to how heterozygosis may promote canalization we leave the realm of fact entirely, and though a possible generalized explanatory model is presented, its value is rather reduced by the initial uncertainty as to whether there is in fact a general relationship between heterozygosis and canalized development.

As far as plant breeders are concerned, point (5) is the thesis of most immediate importance. It is now generally recognized that selection is a far more complex process than once envisaged and that attempts to predict the results of selection from models involving gene content alone have not been successful. The author's distinction between metric traits and fitness is perhaps too sharply drawn, nevertheless the examples he provides of the relations between the two are of much interest and throw considerable light on the theory of artificial selection.

Professor Lerner's book is a contribution of first importance to breeding work. Occasionally, the reader wonders whether finesse is not carried to excess, as when the unexpectedly normal phenotype on p. 70 is referred, admittedly with some hesitation, to teleogenetic paragenesis. A mixed reception will probably be given to the statement that "there may be limits to what one gene can do." The general impression, however, is of a thorough and stimulating treatment of a highly important and difficult subject.

TROLL, W.
Praktische Einführung in die Pflanzenmorphologie. Erster Teil: Der vegetative Aufbau. (**Practical introduction to plant morphology. Part One: Vegetative structure**).
Gustav Fischer Verlag, Jena 1954 : DM 15.60 : Pp. vi + 258 : 239 figs.

Professor Troll is well known as one of the

foremost exponents of the morphological principles associated with Goethe, and his studies on the morphological types or Bilder of higher plants, especially the inflorescence, are recognized as among the most significant morphological contributions of the present century.

The present volume, like the author's *Allgemeine Botanik* (*General Botany*), which was reviewed in *PBA*, Vol. XIX, p. 923, deals with the subject at the factual rather than the interpretative level, or, as Professor Troll prefers to express it, may be regarded as primarily phenomenological in aim. The subject matter considered is the gross morphology of the root, shoot and seed. The floral organs are to be treated in part two. The term *praktische* in the title merely indicates that the book is a text book for students; laboratory technique is not treated.

The book is divided into 38 sections, most of which contain succinct descriptions of a series of types illustrating some morphological category such as the rosette, stipules, leaf insertion and orientation, gamophylly, short shoots, bulbs or rhizomes. Illustrations are liberally scattered over the pages and are of high quality. The emphasis of the book is on the dicotyledons; gymnosperms receive incidental attention merely as exemplifying short shoots while monocotyledons do not make their appearance till p. 169 where the grass leaf is described.

One of the most useful features of the book is the way in which morphological categories such as auricled leaves, which tend to be lumped with other categories, are here set apart. Many will disagree with the categories which the author does distinguish, but few will deny the value of a fresh slant on those that survive so insistently in our text books.

Perhaps the least satisfactory quality of the book is its arrangement. The sequence of categories appears to be governed by no consistent principle. Thus, the dicotyledonous seedling germinates in sections 2–4 and sends forth leaves in most of sections 5–24. The monocotyledonous shoot appears in section 25 and is joined by the root in the next section; germination is delayed till sections 31–33 and is followed immediately by a general consideration of monopodial and sympodial branching.

Professor Troll's book is likely to be of most value to lecturers and demonstrators who will find many suggestions whereby they may variegate one of the most stereotyped of their courses.

Olthoff, B. H. & Mulder, F.
Handleiding voor zaadteelt op landbouwbedrijven. (**Manual of seed-growing in agricultural concerns**).
Staatsdrukkerij en uitgeverijbedrijf, 's-Gravenhage 1953 : f. 6,50 : Pp. 211 : 75 figs. : tables.

This handbook, which is claimed by the authors to be the first of its kind to be published in the Netherlands, is designed to provide a ready source of information for seed producers and seedsmen on matters appertaining to the industry. Considerable care has been taken in its compilation, the authors in their preface stating that they have worked in close conjunction both with official seed-testing bodies and with private seed firms and commercial growers, and have studied all the relevant literature on the subject. The book is mainly concerned with the production of flower, vegetable, sugar beet and forage plant seed. Part I deals with the economic importance of the industry to the Netherlands economy, especially in view of the large amounts of seed that are exported every year, official regulations governing the quality requirements of seed for both the home market and export trade, marketing arrangements and pricing systems for different grades. Part II is devoted to general agronomic factors such as climate, soil, cultural measures, including the use of fertilizers, and the necessity of avoiding contamination. The third part deals with the individual crops, listing the most important varieties in each case, and is divided into two sections, concerned with monocotyledons and dicotyledons, respectively, the second section being further subdivided into chapters on the Chenopodiaceae, Caryophyllaceae, Cruciferae, Leguminosae, Umbelliferae and Compositae. Detailed information on the agronomic requirements of each plant species treated is given, together with a brief account of diseases and pests that may be encountered and the best stage at which to harvest the seed crop. Appendices at the end give tabulated agronomic data on less important crops not dealt with in the text of the book, extracts from some of the more important ordinances concerning the seed trade in the Netherlands and copies of forms to be used in applying for official certification, and a list of the major crop plants discussed, together with their Latin, English, German, French, Danish, Swedish and Spanish equivalents.

This handbook, which is clearly written and well illustrated, should prove of considerable value to seedsmen in the Netherlands, providing as it does a comprehensive summary of the

highly specialized knowledge required in the industry. Elsewhere its use may be restricted by language difficulties and by the fact that it deals mainly with the subject as it affects the Netherlands. Nevertheless, the wealth of information contained on the general agronomic principles involved in seed production should make it a worthwhile purchase for foreign readers who are acquainted with the Dutch language.

Annual review of microbiology. Volume 8.
Annual Reviews, Inc., California, USA 1954 : Pp. 536 : figs. : tables.

The eighth volume of this series (cf. *PBA*, Vol. XXIV, p. 143) opens with a joint survey of recent work on the cytology of bacteria, S. Mudd dealing with the cellular aspects and E. D. DeLamater with the nucleus. The latter author examines at some length the evidence for and against the occurrence of mitosis in bacteria, taking the opportunity to refute the criticisms made by Bisset and others concerning the investigations he himself and his colleagues have carried out. Like its predecessor, this volume contains a section on the genetics of microorganisms, contributed this time by S. Spiegelman and O. E. Landman, who, carrying on from the previous survey, examine the literature that has appeared during 1953. The "almost explosive rapidity" with which microbial genetics is developing is certainly shown by the long bibliography of 481 references covering but a single year. This spate of papers is discussed under the main headings of phenogenetics, gene transmission and life cycles, the nature and properties of the genetic material, and methods: anyone wishing to keep abreast of recent advances in microbial genetics and their wider implications should make use of this labour-saving and clearly expounded survey. A contribution by D. Hendlin deals with the nutrition of microorganisms, another by J. J. R. Campbell with their metabolism. A. E. Evans (Jun.) contributes a paper on Bacterial viruses with particular reference to their synthesis. Other papers of possible interest to plant geneticists are Antigenic variation of influenza viruses by M. R. Hilleman, Effects of viruses on tumors by A. E. Moore, Foods and feeds from fungi by F. S. Thatcher, and Cytopathology of virus infections, chiefly with reference to tissue culture studies, by J. F. Enders.

Ainsworth, G. C. & Bisby, G. R.
A dictionary of the fungi.
Commonwealth Mycological Institute, Kew, Surrey 1954 : 4th ed. : 20s. : Pp. viii + 475 : figs.

The second edition of this work was reviewed in *PBA*, Vol. XVII, p. 496. The present volume, while retaining the same basic lay-out as the earlier editions, brings the work thoroughly up to date. The most important changes have been due to the application of the new International Code of Botanical Nomenclature adopted in 1950. The inclusion of several hundred new generic names has been necessary and a comparable number have had to be modified. In the present chaotic state of mycological nomenclature it is impossible, as the authors point out, to give an authoritative classification. The new edition will, however, be an invaluable handbook for mycologists and will fill the same useful role as its predecessors.

29e beschrijvende rassenlijst voor landbouwgewassen 1954. (**Twenty-ninth descriptive list of agricultural crop plants, 1954**).
Rijkscommissie voor de Samenstelling van de Rassenlijst voor Landbouwgewassen, Wageningen 1954 : Pp. 336 : tables.

The latest edition of the above publication, issued by the Dutch Government Committee for the Compilation of the List of Varieties of Field Crops, has now appeared, together with a short guide, in English, to the contents. It is written along the lines of the previous edition (cf. *PBA*, Vol. XXIII, p. 484) and provides useful information on new varieties developed in the Netherlands.

Altwegg, H.
Cotton from the quality angle.
Volkart Brothers, Winterthur 1953 : Pp. 67 : table.

This publication is intended primarily for those interested in cotton as a commodity and it provides concisely expressed and well-arranged information on the various aspects of quality with which anyone engaged in the cotton industry, particularly the import trade, should be familiar. Part I gives a very elementary account of the growing of the crop, the properties determining quality in general, and of marketing seed and ginned cotton. In Part II detailed descriptive notes are to be found on the qualities of the types and varieties grown in the chief cotton-producing regions of the world, together with information on the areas of cultivation. A useful chart indicating the colour and staple length of the cottons described is appended.

COULSON, A. F. W. (EDITOR)
Manual of cotton spinning. Volume I. Raw cotton production and marketing.
The Textile Institute, Manchester 1954 : 12s. 6d. : Pp. xiii + 222 : figs. : tables : maps : plates.

This volume is the first of a series whose publication under the general title of *Manual of Cotton Spinning* has been planned by the Textile Institute, Manchester, England. As the editor informs us in his preface, the complete *Manual* will consist of seven volumes, to be published at intervals during the next few years. This initial part gives a broad and introductory survey of raw cotton production and marketing, written by experts in their particular fields. The first section, "The history and structure of the cotton industry," was compiled by members of the Statistics Department of the Cotton Board. Its introductory chapter is followed by a chapter on the industry in the United Kingdom and one on the industries in other countries. Section II, "The cotton crop" by E. Lord, of the Shirley Institute, contains two chapters, one dealing with fundamental aspects of cultivation, harvesting and ginning, and the other with raw cotton production in different countries. In the three chapters of Section III, C. R. Barber, of the Raw Cotton Commission of the United Kingdom, explains the organization and operation of the world's markets. Sir Raymond Streat, Chairman of the Cotton Board, contributes a foreword to this well-produced and clearly written first-comer to a series that promises to be very useful.

JAHN, R. (EDITOR)
Tobacco dictionary.
Philosophical Library, New York 1954 : $5.00 : Pp. 199 : figs. : 1 plate.

As the editor states in the introduction to this publication, it "seeks to bring to the smoker the interesting, curious and necessary facts relating to the history, manufacture and use of tobacco"; in addition, we are also given information on grades, marketing and personalities connected with the tobacco industry.

Readers of *Plant Breeding Abstracts* will be most interested in the notes on the distribution and qualities of named varieties, though a considerable number of well-known varieties such as Ambalema and Delcrest do not appear. The scientific information given on such topics as diseases is at a very elementary level, but in a book intended for the general public this is not necessarily a criticism. What is rather more surprising is the somewhat patchy treatment of the countries concerned with the tobacco industry. Thus Switzerland receives quite a long notice while the important tobacco-producing countries Hungary, Bulgaria and Rumania are not even mentioned under these headings. The author is not particularly concerned with such details as the accentuation of foreign words.

The convenience, however, of having the very scattered information that the author has managed to assemble in one volume is indisputable, and tobacco breeders will doubtless find the volume a useful addition to their reference library.

PETELOT, A.
Les plantes médicinales du Cambodge, du Laos et du Viêt-Nam. (**The medicinal plants of Cambodia, Laos and Viêtnam**).
Arch. Rech. agron. Pastor. Viêt-Nam 1953 : Vo. II : No. 18 : Pp. 284; 1954 : Vol. III : No. 22 : Pp. 347.

Two more volumes of this extensive work of reference, reviewed in *PBA*, Vol. XXIV, p. 300, have now been published. Vol. II deals with the families Caprifoliaceae to Plantaginaceae, and Vol. III with the families Amarantaceae to Salicaceae, monocotyledons and gymnosperms. To the latter volume a short supplement containing miscellaneous notes on certain genera has been appended.

7e beschrijvende rassenlijst voor fruit. (**Seventh descriptive list of fruit varieties**).
Commissie voor de Rassenlijst voor Fruit, Wageningen 1954 : Pp. 159 : figs. : tables : plates.

The 1954 edition of this useful publication provides a wealth of up-to-date information on varieties of fruit at present being cultivated in the Netherlands and may be recommended as a reliable and trustworthy guide for the practical fruit-grower. The salient characters of the principal varieties of pome and stone fruits, small fruits, nuts, figs, grapes, quince, medlar and mulberry are lucidly described and questions concerning choice of apple, peach, plum, apricot, cherry and grape rootstocks discussed in some detail. Reference to the mass of comprehensive and highly detailed information contained in the booklet is facilitated by ingenuity in arrangement and a well-arranged index.

FRETS, G. P.

The heredity of the dimensions, the weight and the indices (size and form) of the seeds of *Phaseolus vulgaris*.

Martinus Nijhoff, The Hague 1954 : f. 7.60 : Pp. 80 : 17 figs. : 9 tables.

In this publication, the author gives an account, somewhat obscured by philosophical digressions, of his early and more recent investigations on the inheritance of quantitative characters of the seeds of *Ph. vulgaris* (cf. *PBA*, Vol. XIX, Absts. 1405, 1408 and 1409, and Vol. XXII, Abst. 2335). He reaches the general conclusion that hereditary variability in these characters is due to the control of the length, breadth and thickness by a polymeric gene system, postulating the independent inheritance of the genes for each dimension. He assumes that the genes for each dimension are equal in number and that each gene conditions a definite increase in the particular dimension. He suggests that in the case of beans with very small dimensions the polymeric factors may have undergone transgressive segregation of the minus type. The characteristics of weight, size and shape are regarded primarily as expressions of the coordination during growth between the precise effects of the genes governing each dimension.

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